

**CLASS 251, VALVES AND VALVE ACTUATION****SECTION I - CLASS DEFINITION**

This class provides for means, for regulating flow of a fluid through a passage, either by closing the passage or restricting it by a definite predetermined motion of the closing-element, that are of general application not otherwise provided for.

**SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS**

A valve is distinguished from a closure of the cap type by being shiftable between open and closed position in the device rather than bodily removable from it, but pivoted closures and many pivoted valves have no definable difference. For this reason, closures associated with valves have been grouped with plural valves in certain parts of Class 137, Fluid Handling.

See the Class Definition of Class 137, Fluid Handling, References to Other Classes, for collected search notes on automatic valves, plural valves and their actuators, and manual valve actuation, selection, and/or adjusting.

**SECTION III - REFERENCES TO OTHER CLASSES****SEE OR SEARCH CLASS:**

- 4, Baths, Closets, Sinks, and Spittoons, for valves combined with devices of that class, and for valves specialized for use in such devices.
- 16, Miscellaneous Hardware, subclass 117 for insulated handles adapted for general use on rotary stems.
- 29, Metal Working, subclasses 888.4+ and 890.12+ for processes of making valves and valve seats.
- 48, Gas: Heating and Illuminating, subclass 58 for valves for acetylene generators.
- 49, Movable or Removable Closures, appropriate subclasses for closures of the type provided for and see the search notes thereto in References to Other Classes for the loci of closures in other classes.
- 62, Refrigeration, appropriate subclasses, for a refrigeration producer including an expansion valve specialized to such purpose, particularly subclasses 204+, 210+, 216, and 528.
- 70, Locks, subclasses 175+ and 242+ for lock mechanisms for valves where no particular

structure of the valve beyond accommodation of the lock is involved.

- 73, Measuring and Testing, subclass 179, 203, 220, 221, 249, 265+, 268+, 271, and 276 for valve organizations associated with major devices.
- 84, Music, the various "pneumatic" and wind instruments, for valves specialized for such devices.
- 91, Motors: Expansible Chamber Type, appropriate subclasses for valves combined with expansible chamber motors, the valve acting as a control for the motive fluid for the motor.
- 110, Furnaces, appropriate subclasses, for valve organizations associated with furnaces.
- 114, Ships, subclass 197 and 198, for boat plugs and sea cocks.
- 116, Signals and Indicators, subclasses 67+ for valves in combination with alarms, and subclass 277, for valve position indicators.
- 122, Liquid Heaters and Vaporizers, subclass 437, 451.2, and 507 for valves associated with liquid heaters and vaporizers.
- 123, Internal-Combustion Engines, subclasses 90.1+ and 188.1+ for valves peculiar to internal-combustion engines.
- 126, Stoves and Furnaces, subclasses 285+ for dampers.
- 128, Surgery, subclass 207, 210 and 211, for valved inhalers.
- 137, Fluid Handling, for fluid handling apparatus and processes not otherwise provided for including combinations with valves, certain special types of valves with or without actuators, and valves with complex actuators; subclasses 38+ for valves operated by change of position or inertia of the system; subclasses 47+ for speed responsive valve control; subclasses 67+ for flow control by destructible or deformable means; subclasses 171+ for fluid separating valves in diverse fluid containing pressure systems; subclasses 233+ for valves for inflatable articles such as tires; subclasses 243+ for valve grinding motion of valves on seats; subclasses 246+ for lubrication or liquid supplied at the valve interface; subclasses 247+ for liquid valves and liquid trap seals; subclasses 269+ for valves convertible to change the mode of operation; subclasses 272+ for hydrant valves; subclasses 309+ for regenerative furnace type reversing valves; subclasses 329.1+ for repair check valves; subclasses 382+ for valve guards; subclasses 383+ for valves with locks or seals; subclasses 386+

- especially subclasses 397, 398+ and 409+ for float controlled valves; subclasses 454.2+ for removable valve head and seat units, see the search notes thereto; subclasses 455+ for line condition change responsive valves, such as safety valves, pressure regulators and check valves; subclasses 544+ for valves with filters or strainers; subclasses 551+ for valves with indicators, registers, recorders, alarms or inspection means; subclass 560 for valves combined with other structure; subclasses 561+ for fluid handling systems including valves, particularly subclasses 615+ for valves actuated by swinging spouts and subclasses 625+ for multi-way valve units; subclasses 624.11+ for a distribution system including a programmer or a timer.
- 138, Pipes and Tubular Conduits, subclasses 40+ for similar structure where the flow is not cut off entirely, subclasses 89+ for nonvalve closures and plugs for conduits, especially subclasses 94.3+ for line blinds, and see (1) Note thereunder for the line.
- 141, Fluent Material Handling, With Receiver or Receiver Coacting Means, appropriate subclasses for valved filling devices.
- 152, Resilient Tires and Wheels, subclasses 415+ for inflating devices, for pneumatic tires.
- 166, Wells, subclass 97.1 for a valve on a cap or wellhead, and subclasses 316+ for below-ground well devices with valves.
- 169, Fire Extinguishers, subclasses 19+ for valves associated with sprinkler systems designed to extinguish fires.
- 177, Weighing Scales, subclasses 60+ for weigher responsive flow control.
- 184, Lubrication, for lubricating devices with valves, particularly subclasses 33 through 35 for pump lubricators with valves, subclasses 66+ for gravity feed type lubricators with automatic valves and subclasses 80, 82, 83, 86, and 87 for other gravity feed lubricators with valves.
- 193, Conveyors, Chutes, Skids, Guides, and Ways, subclass 20, 21, 28, 31+, 32, and 39 for devices controlling the flow of chutes.
- 200, Electricity: Circuit Makers and Breakers, subclass 61.86 for valve operators, manipulation of which additionally makes or breaks a circuit, and subclasses 81.9+ for flow responsive devices which control elements of a switch.
- 202, Distillation: Apparatus, subclasses 255+ for valves specialized to distillation.
- 209, Classifying, Separating, and Assorting Solids, for valve combinations, particularly subclass 246, for sifter feeding hoppers with cut-offs and valves, subclass 258, for discharging valves for sifters, and subclasses 488+, 490+ and 497+, for feeding and discharging means for stratifiers.
- 210, Liquid Purification or Separation, appropriate subclasses for various combinations of a valve and separator, particularly subclass 92, 97+, 181, 245, 277+, 313, 340, 362, 392, 395+, and 418+.
- 215, Bottles and Jars, subclasses 17+ for valved closures having features to prevent refilling of the receptacle and subclasses 311+ for other valved closures.
- 217, Wooden Receptacles, subclasses 99+ for valved barrel bungs.
- 220, Receptacles, subclasses 200+ for closures adapted to remain in the articles with which they are associated, and see the notes thereto for closures, and subclass 86.1 for milking pails with a valved inlet.
- 222, Dispensing, for valves, cut-offs and discharge controllers in dispensing combinations, as where (a) the structural features of a supply container with or without material guiding means or the relation of the valve or its actuator thereto is claimed, (b) a dispensing type discharge assistant is claimed in combination with a valve, cut-off or discharge controller, (c) a preset or automatic cut-off is controlled by dispensed volume or rate of flow, (d) plural valves are so related as to have a measuring function, (e) or the valve, cut-off or discharge controller is considered to be specially adapted for dispensing purposes, as those operated by pressure applied to the contents of the supply container or by inversion of the supply container.
- 235, Registers, subclass 94, for devices for registering the number of times a valve is operated.
- 236, Automatic Temperature and Humidity Regulation, for thermostatically-controlled valves.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclass 87, 93+, 95, 96, 537+, and 569+ for valves in nozzles.
- 250, Radiant Energy, subclasses 229+ for prephoto-cell light valves.
- 261, Gas and Liquid Contact Apparatus, for valves associated with special contact apparatus.
- 303, Fluid-Pressure and Analogous Brake System, subclasses 54+ for self-lapping valves and subclass 84.1+ for flow retarders and cut-offs.

- 359, Optics: Systems (Including Communication) and Elements, subclasses 227+ and 238+ for light valves.
- 361, Electricity: Electrical Systems and Devices, subclasses 254+ for gas-controlled valves operated by magnets, utilized in igniting means.
- 383, Flexible Bags, subclasses 44+ for the combination of a bag with a valve-type closure.
- 401, Coating Implements With Material Supply, appropriate subclasses, see particularly, subclass 36, 40+, 45+, 135, 136, 204, 205+, 219+, 232+, 258+, 263+, 270+.
- 406, Conveyors: Fluid Current, subclasses 124+ for valves between plural receptacles in series at the conveyor inlet; and subclasses 127+ for valves between a conveyor and a material feeding receptacle.
- 454, Ventilation, subclasses 265+, 322+ and 333+ for valves associated with ventilating means.
- 604, Surgery, subclasses 32 through 34, 236 to 238, 248 to 250 and 256.
- D23, Environmental Heating and Cooling, Fluid Handling and Sanitary Equipment, subclasses 200+ for fluid handling or treatment equipment and subclasses 233+ for valves.

#### SUBCLASSES

#### 1.1 BLOW-OUT PREVENTERS (I.E., COOPERATING SEGMENTS OF ANNULUS:

This subclass is indented under the class definition. Subject matter comprising a plurality of relatively movable flow obstructing members which control an annular flow passage about an axial rod or pipe as between a well casing and drill stem and have characteristics which go beyond a mere sealing means.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 146, for valves and/or couplings made in sections to facilitate mounting on continuous conduits.

SEE OR SEARCH CLASS:

- 166, Wells, subclasses 75.11+, especially subclasses 86.1+ and 88.1 for well heads comprising blow-out preventers and additional means for handling fluid from the well or other specific well features, and subclasses 179+

- and the subclasses there noted for packers or plugs inserted into a prepositioned well conduit.
- 222, Dispensing, subclasses 502+ for sectional valves in dispensers.
- 227, Elongated-Member-Driving Apparatus, appropriate subclasses, for a packing between a casing head and an inner pipe or rod particularly subclass 4 for a pipe end attached packing assembly, subclasses 5+ for a packing between a casing head and a longitudinally moving coupled rod, and subclass 31 for a rotatable packing for an axially moving rod.
- 277, Seal for a Joint or Juncture, for a generic sealing means or process, subclasses 324+ for a seal for well apparatus having an overpressure control device that may include extrusion preventing (i.e., anti-extrusion) structure.
- 285, Pipe Joints or Couplings, subclass 123.14 for joints between concentric stationary pipes (e.g., and packing type blow-out preventer between a well casing head and a tubing).

#### 1.2 Deformable annulus:

This subclass is indented under subclass 1.1. Subject matter wherein one of the flow obstructing members comprises an annular member capable of having its shape changed by application of a force to thereby control flow through the annular flow passage.

#### 1.3 Radial reciprocating ram:

This subclass is indented under subclass 1. Subject matter .1 which includes a member mounted for reciprocation in a radial direction to exert and relieve pressure on one of the flow obstructing members to open and close the annular flow passage.

- 3 This subclass is indented under the class definition. Subject matter wherein the valve is provided with an actuator including a tracer element which is designed to contact a pattern.

- (1) Note. This type of actuation is usually used in duplicating machines wherein the pattern is the shape of the article to be made and the valve is the control subcombination of the duplicating machine.

- SEE OR SEARCH CLASS:
- 91, Motors: Expansible Chamber Type, subclass 37 for expansible chamber motors controlled by a pattern or template controlled valve.
- 409, Gear Cutting, Milling, or Planing, subclasses 79+ for a pattern controlled milling machine.
- 4** This subclass is indented under the class definition. Devices which control flow by compression of a flexible fluid conveying tube.
- SEE OR SEARCH CLASS:
- 24, Buckles, Buttons, Clasps, etc., subclasses 129+ to 136+ for similar structures for clamping or holding cords or ropes, and subclasses 243+ for clasps of general utility.
- 81, Tools, subclasses 300+ for pliers and subclasses 53+ for wrenches.
- 137, Fluid Handling, subclasses 355.18+ for tube compressors combined with hose storage or retrieval means.
- 5** This subclass is indented under subclass 4. Devices which are actuated by fluid pressure.
- 6** This subclass is indented under subclass 4. Devices comprising rollers which contact and compress the conveyor.
- 7** This subclass is indented under subclass 4. Devices comprising a tube contacting portion which reciprocates perpendicularly of the axis of the flexible conveyor.
- 8** This subclass is indented under subclass 7. Devices having screw means to actuate the contacting portion.
- 9** This subclass is indented under subclass 4. Devices comprising a tube contacting portion which pivots, as a lever, to compress the conveyor.
- 10** This subclass is indented under subclass 9. Devices comprising a U-shaped resilient bar or rod which pivots at its base to cause the leg portions to grasp the tube.
- 11** This subclass is indented under the class definition. Subject matter wherein the valve is provided with a device which converts heat energy into motive power or in which energy from a variation in buoyancy of a body is used to actuate the valve.
- (1) Note. An example of a buoyancy motor is a hollow shell which when full of liquid sinks in the liquid but which floats when the liquid is pumped out of the shell.
- SEE OR SEARCH CLASS:
- 60, Power Plants, subclasses 495+ for motors having a buoyant working member motivated by the vertical rise and fall of the surface of a body of fluid, and subclasses 508+ or 516+ for motors which transduce temperature variation to work through the expansion or contraction of a confined solid, liquid or gas.
- 137, Fluid Handling, subclass 76 for heating means for heat destructible or fusible control elements, subclasses 334+ for means for supplying or exchanging heat in fluid handling means, especially subclass 341 for electric heating elements and see the search notes to subclass 334, subclasses 386+, and the subclasses mentioned in the notes thereto, especially subclass 404 for sinking or bucket type floats and subclass 409, for float actuated, liquid level responsive valves, and see the search notes to subclass 404 and subclass 468 for temperature responsive means controlling valves, and see the search notes thereto.
- 12** This subclass is indented under the class definition. Subject matter in which the opening or closing movement of the valve is produced or modified by the reactive force of a fluid acting against a portion of the actuating means.
- (1) Note. All fluid displacement devices inherently require a period of time to fill or empty the same, the period depending upon the relative sizes of the displacement devices and the flow passages thereto as well as the pressures produc-

ing the flow. As a result, many of the disclosures of this and indented subclasses disclose and make use of this time delay, such as in the case of the "flush" valves, but other disclosures having equivalent constructions make no reference to such time delay. The definitions of this and indented subclasses have been drawn with a view to bring together inherently related disclosures irrespective of the mode of describing the function of the device.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

73, for biased trip valves with fluid pressure actuation of the trip.

**SEE OR SEARCH CLASS:**

92, Expansible Chamber Devices, appropriate subclasses for an expansible chamber device, per se.

123, Internal-Combustion Engines, subclass 90.12 thru 90.14, for poppet valve operating mechanism which is fluid actuated.

137, Fluid Handling, subclass 12 for a process of controlling flow by fluid pressure, subclass 14 for a process involving pressure control, subclass 15.18 for a process of assembling, disassembling, or repairing a fluid actuated or retarded valve, subclass 58 for a centrifugal mass type (i.e., exclusive of liquid) speed responsive valve control having a fluid servomotor, subclass 81.1 for an atmospheric pressure responsive control, subclasses 82-86 for pressure modulating relay or follower, subclass 105 for a supply and exhaust type self-proportioning or correlating vacuum suction pulsator type system (e.g., milking machine, etc.) using a pulsation responsive pilot valve, subclasses 219-222 for Laner-Johnson valves, especially subclasses 221-222 for those having an internal servomotor with an internal pilot valve, subclasses 413-415 for fluid pressure type servo relay control of or response to liquid level and subclasses 455-543.23 for valves responding to change in line pressure and/or flow conditions to control the flow, espe-

cially subclasses 488-492.5 for fluid pressure type servomotor control of the valve, subclasses 596.14-596.16 for pilot actuated supply and exhaust valves, subclass 596.18 for a fluid motor actuated supply and exhaust valves, subclass 601.13 for systems dividing into parallel flow lines then recombining having a fluid actuated or retarded valve, subclass 625.6 for pilot actuated supply and exhaust multi way valve units, or subclass 625.66 for fluid motor actuated supply and exhaust multi way valve unit. Dispensing, subclasses 59+ for dispensers having flow meter operated cut-offs, subclass 334 for fluid motor operated discharge assistants in dispensers and subclass 504 for motor operated dispenser outlet elements.

222,

**14**

This subclass is indented under subclass 12. Subject matter in which both a fluid actuator and an actuator other than one utilizing fluid are provided for alternative use.

(1) Note. Actuators which include both fluid actuation mechanism and nonfluid actuation mechanism but in which said mechanisms are not of themselves each capable of fully controlling the valve are not considered to be alternative within the scope of this subclass and are classified in an appropriate subclass for the fluid actuation mechanism and cross referenced for novel nonfluid actuation mechanism. Examples of such excluded devices are electrically controlled pilot valves in subclass 30 and manually opened and fluid pressure closed valves in subclasses 48+.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

30, for electrically controlled fluid actuators, and see (1) Note.

48+, for manually opened, fluid pressure closed valves and see (1) note.

130, for electrical actuators combined with a nonfluid, nonelectrical actuator.

**15**

This subclass is indented under subclass 12. Subject matter in which the flow of fluid, when established by external means under the control

of the operator, is stopped after an interval of time irrespective of the continued application by the operator of the original control effect that initiated the flow.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

48+, for fluid actuated devices which delay closing but are not effective until the external control is released.

**SEE OR SEARCH CLASS:**

137, Fluid Handling, subclasses 386+ for control by liquid level responsive means, i.e., by accumulated quantities in a container or a control chamber which reflects the condition in the container and subclasses 456+ for safety cut-offs which require manual resetting.

222, Dispensing, subclasses 14+ for dispenser cut-offs operated by selectively preset volume or rate of flow responsive mechanism, and subclasses 59+ for dispenser cut-offs operated by rate of flow responsive mechanism.

**16** This subclass is indented under subclass 15. Subject matter in which a manually controlled valve and a fluid actuated or retarded shut-off valve are sequentially arranged in the flow line so that flow takes place only during the time both valves are open.

(1) Note. The shut-off valve is usually a safety or loss preventing valve intended to prevent prolonged use of the fluid under external control or loss in case of rupture of a hydraulic line. They are frequently called hydraulic fuses.

(2) Note. Since these valves are reset only by operation of the manual valve they are included here even if claimed as a subcombination.

**SEE OR SEARCH CLASS:**

137, Fluid Handling, subclasses 102+ for devices, sometimes called "hydraulic fuses", in which flow between a pump and distributor valve is interrupted after an interval unless exhaust flow from the distributor valve to the reser-

voir occurs; subclass 467 for valves which open in response to a change in line condition and require resetting, and subclasses 613+ for distributing systems comprising a single flow path with plural serial valves and/or closures.

**17** This subclass is indented under subclass 16. Subject matter in which the manual and fluid actuated or retarded valve are conjointly actuated at least during a portion of their motions.

(1) Note. In some disclosures in this subclass, one valve is manual only and one is opened manually and closed or retarded by fluid pressure means, and the first valve prevents flow during the manual opening of the second or fluid actuated valve and opens only when the fluid actuated or retarded valve has started its closing motion.

**18** This subclass is indented under subclass 17. Subject matter in which the fluid actuated or retarded valve is controlled by a pilot valve that is interconnected with and moved by the manual valve.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

25+, for fluid servo-motor actuated valves, and see the search notes to subclass 25.

**19** This subclass is indented under subclass 15. Subject matter in which the main valve is opened by adjustment of a control or pilot valve in a servo actuating system for the main valve but is caused to start closing by a second control or pilot valve made effective by the opening of the main valve, irrespective of the adjustment of the first pilot valve.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

29, for fluid actuated pilot valves with additional pilot valve control.

**20** This subclass is indented under subclass 15. Subject matter in which the actuator which opens the valve is subjected to an overriding closing force by a fluid actuated or retarded

device only after the completion of the desired flow period.

**SEE OR SEARCH CLASS:**

222, Dispensing, subclasses 17+ for preset volume dispensers in which a moving cut-off operating element returns to its neutral setting during dispensing.

**21** This subclass is indented under subclass 15. Subject matter in which coacting elements of the external actuating means for the valve are so related to each other that they transmit an opening motion to the valve, but upon the valve attaining its open position the co-acting elements are sufficiently disengaged as to permit the valve reclosing under the action of the fluid actuating or retarding means even if the opening force on the external means is maintained.

**22** This subclass is indented under subclass 15. Subject matter in which a control pressure normally maintaining the valve closed is momentarily reduced, so that the valve can open, by discharge into an empty closed chamber, but upon the subsequent rise in pressure, due to filling of the chamber, the valve recloses.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

33+, for choked pressure fluid type servomotors in which the discharge of the fluid in the choke chamber is to waste or to the line, the flow being terminated by reverse movement of the pilot valve.

**23** This subclass is indented under subclass 15. Subject matter in which a valve biased toward its closed position is opened by a force transmitted through a trapped body of fluid in a chamber having a restricted inflow or outflow opening and recloses under its bias when sufficient flow through the restricted opening has taken place.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

57, for fluid link or column actuators for valves.

**24** This subclass is indented under subclass 12. Subject matter in which the valve has the opening or closing forces acting thereon augmented or altered by a force resulting from a fluid pressure derived from the velocity flow of fluid in the line acting on a reactor surface other than the valve head or closure element.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

37, for choked fluid pressure type servomotors having a choke or restriction in the main line.

123+, for valves located at a point of restriction in a line.

**SEE OR SEARCH CLASS:**

137, Fluid Handling, subclasses 219+ for Larner-Johnson valves, in which the needle seats on a restricted portion of the flow line and subclasses 497+ for valves having a separate connected fluid reactor surface and adjusted entirely by variations in fluid flow in the line, especially subclass 502 for expansible chamber reactors subject to differential pressures, one pressure being that at the throat of a Venturi tube.

**25** This subclass is indented under subclass 12. Subject matter in which the valve is actuated, at least in part, by a fluid pressure motive means deriving its power from either the fluid line or a separate source of fluid pressure and controlled by an auxiliary or pilot valve or valves.

(1) Note. Fluid pressure servo-motors having valves both for the inlet and the outlet or vent of the pressure chamber are in this subclass.

**SEE OR SEARCH CLASS:**

91, Motors: Expansible Chamber Type, appropriate subclasses for expansible chamber motors, per se.

137, Fluid Handling, subclass 46 for inertia responsive systems having servo mechanisms, subclass 58 for centrifugal governor controlled servo actuated valves, subclasses 82+ for pressure modulating relays or followers, sub-

class 105 for pulsators with pulsation responsive pilot valve, subclasses 191 and 195 for gas and liquid separating traps having servo-control of the valves, subclasses 219+, especially subclass 222 for Lerner-Johnson type valves having hollow telescoping sections which function as servo units, subclasses 413+ for fluid pressure servo-motor operation of a level responsive valve, subclasses 485+ for servo-operated line condition responsive valves, and subclasses 596.14+ for pilot actuated supply and exhaust valves, and subclasses 625.6+ for pilot actuated supply and exhaust multiway valve units.

- 26** This subclass is indented under subclass 25. Subject matter in which the servo-motor may receive fluid from any one of two or more sources of fluid pressure or in which two or more pilot valves are employed for a single servo unit, one pilot valve duplicating the function of another pilot valve.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 19, for servo-systems having an additional pilot valve which compels reclosing of the main valve irrespective of the position of the first pilot valve.
- 25+, for servo-systems in which there are two or more pilot valves not duplicative of their functions and not classifiable in subclasses 29 and 31, such as inlet and outlet valves.
- 29, for pilot valves controlling fluid flow to a fluid actuated pilot valve.
- 31, for servo-systems in which a plurality of pilot valves control a corresponding number of servo units.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclasses 65+ for plural servo-motor control valves in a speed responsive prime mover control.

- 27** This subclass is indented under subclass 25. Subject matter in which means are provided for causing the main valve to assume a position other than biased open or biased closed upon a

loss of servo operating pressure, i.e., a position other than that which the uncontrolled valve would assume under pressure of the material flowing through the line.

- 28** This subclass is indented under subclass 25. Subject matter in which the auxiliary or pilot valve controlling the main valve is operated by a fluid responsive device.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 32, for latched pilot valves for fluid servo-motors with fluid pressure means to release the latch.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclass 105 for such systems in which the pilot valve is itself controlled by the main valve. These are generally suction operated milker pulsators and subclasses 485+ for line condition change responsive valves having fluid actuated pilot valve means which responds to changing pressures or flow conditions in the line.

- 29** This subclass is indented under subclass 28. Subject matter in which the fluid responsive device that operates the pilot valve is controlled by an additional pilot valve.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 26, for plural alternative pilot valves, and see the search notes on plural pilot valves in the definition.

### **30.01 Electrically actuated pilot valve:**

This subclass is indented under subclass 25. Subject matter in which the auxiliary or pilot valve controlling the valve is operated by electrical energy.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 32, for electrically released trip pilot valves.
- 129.01+, for electrical actuators for main valves, and see the search notes to subclass 129.



## SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 315.03 for a fluid handling system with repair, tapping, or assembly means for an electromagnetically actuated valve (e.g., solenoid, etc.), subclass 596.16 for systems having an electrically actuated pilot valve for a supply and exhaust valve, subclass 599.07 for systems having separately actuated valves operated in common by an electrically actuated digital flow controller and their flow lines, subclass 601.14 for systems dividing into parallel flow lines then recombining having an electrical valve actuator, or subclass 625.64 for system shaving an electrically actuated pilot valve for a supply and exhaust multi way valve unit.

**30.02 Main valve biased closed by fluid pressure:**

This subclass is indented under subclass 30.01. Subject matter in which force per unit area exerted by a fluent material is used to maintain the valve in a position which closes a passage to fluid flow until the valve actuator moves for valve to a position which opens the passage.

**30.03 Venting passage within movable main valve:**

This subclass is indented under subclass 30.02. Subject matter in which the valve is opened by releasing pressure through a passageway in a movable portion of the valve.

**30.04 Pilot valve movably mounted within or around main valve:**

This subclass is indented under subclass 30.03. Subject matter in which movement of the pilot valve is limited by the movable portion of the main valve, the pilot valve being either contained or guided by the movable portion of the main valve.

**30.05 Fluid pressure sole means for biasing valve closed:**

This subclass is indented under subclass 30.02. Subject matter in which the force per unit area exerted by a fluent material is the only agent used to maintain the main valve in the position.

**31**

This subclass is indented under subclass 25. Subject matter in which the main valve is operated in one direction by a servo unit and another direction by a second servo unit.

- (1) Note. The oppositely acting servo units of this subclass may constitute different sides of the same piston and further the pilot controls for the opposing servo units may be utilized, as in a single reversing or four-way valve.

## SEE OR SEARCH CLASS:

91, Motors: Expansible Chamber Type, appropriate subclasses for servo-motors, per se.

137, Fluid Handling, subclass 596.15 for supply and exhaust valves operated by plural servo-motors controlled by a single pilot valve, and subclass 625.63 for supply and exhaust multiway valve units operated by plural servo-motors controlled by a single pilot valve.

**32**

This subclass is indented under subclass 25. Subject matter in which the pilot valve is engaged in one position by a detent which retains the pilot valve in that position until released by the detent.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

66+, for biased trip valves, especially subclass 73 for fluid pressure trip actuation.

89+, for valve actuators associated with means for blocking or disabling the actuator.

**33**

This subclass is indented under subclass 25. Subject matter in which the servo-motor is of the type having an expansible pressure chamber the pressure in which is equalized with either a high or a low pressure region by means of a constantly open but restricted passage or communication therebetween to cause the main valve to assume one position, but in which the pressure conditions can be reversed by the opening of a pilot valve in an open or less restricted passage between the chamber and a pressure region other than that connected by

the restricted passage to cause the main valve to assume an opposite position.

- (1) Note. Expansible chamber devices which are constantly open to a single pressure region, even though the opening is restricted, are not servo-motors because motor action can result only by receiving fluid at a higher pressure and exhausting to a lower pressure. Such devices are either a form of fluid bias or a dashpot or other vented chamber.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 50+, for dashpot of fluid controlled retarders or timers receiving pressure from the line controlled. See (1) Note.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclasses 489+ for line condition responsive valves having servo-motors of the choked pressure type.

- 34** This subclass is indented under subclass 33. Subject matter in which means are provided to prevent back flow of fluid around the main valve through the constantly open choke or restriction under transient conditions of pressure change in the main flow line.

- (1) Note. These disclosures usually are described as “anti-siphoning” although there is never any siphonic flow under intended conditions of use.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclasses 215+ for back flow prevention by vacuum breaking in systems which are not designed to have siphon action in ordinary use.

- 35** This subclass is indented under subclass 33. Subject matter in which the choke or restricted communication between the servo-motor chamber and the region of either high or low pressure varies in accordance with the degree of opening or closing of the main valve.

- (1) Note. The variation may be either abrupt or progressive with the travel of the valve.

- (2) Note. The variation may result from changing the size of the pilot communication lines or from providing an additional or alternative path for fluid shunting the choke which is open at the proper time to accelerate or delay valve operation.

- 36** This subclass is indented under subclass 33. Subject matter in which an expansible chamber, other than or in addition to the servo-motor chamber, is provided with a restricted passage to retard the rate of travel of the main valve.

- (1) Note. The expansible chamber may receive fluid from the line or from a separate source, as in the closed fluid circuit dashpot.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 47, for servo operated valves having separate dashpot chambers, in which the servo mechanism is other than of the choked pressure type.
- 48+, for nonfluid actuated valves having similar retarding means, especially subclasses 50+ for expansible chambers receiving fluid from the line and subclass 54 for closed circuit dashpots.

- 37** This subclass is indented under subclass 33. Subject matter in which a flow resistance or choke device is serially connected with and separate from the valve in the main flow line.

- (1) Note. This choke serves to regulate further the rate of flow in the main flow line over and above the regulation provided by the choked pressure type of servo-motor.

- (2) Note. Where the restrictor is attached to and moves with the movable element of the main valve, classification is in the appropriate one for either the valve or the valve actuator.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 24, for fluid actuated valves which are Venturi or line flow effect assisted.

- 118+, for valves having restrictors in series therewith.
- SEE OR SEARCH CLASS:
- 137, Fluid Handling, subclasses 219+ for Larner-Johnson valves, which are associated with and have a seat formed at a restriction in the line, subclasses 436+ for float operated valves having a restrictor and subclasses 500+ for line condition change responsive valves having expansible chamber reactor surface subject to the differential effects resulting from an obstruction in the line.
- 38** This subclass is indented under subclass 33. Subject matter in which the pilot valve co-acts with a seating surface therefor mounted on either the servo-motor element or the main valve so as to partake of the motion thereof.
- (1) Note. Some disclosures identify the pilot valve as a mere relief valve and disclose that the main valve is mechanically opened by the overtravel of the pilot valve actuator, but these are here classified so long as their structure provides for alternating of the high and low pressure conditions in the expansible chamber.
- SEE OR SEARCH CLASS:
- 137, Fluid Handling, subclasses 221+ for Larner-Johnson type valves having an internal pilot valve for an internal servo-motor, subclass 490 for line condition change responsive pilot or servo controlled valves in which the pilot valve is within the main valve head and subclasses 630+ for a main valve and concentric type balancing valve successively operated to open or closed position.
- 39** This subclass is indented under subclass 38. Subject matter in which the pilot valve admits the higher pressure to the motor chamber and the choke establishes a restricted communication between the motor chamber and the lower pressure.
- SEE OR SEARCH CLASS:
- 137, Fluid Handling, subclass 490 for fluid pressure servo type condition responsive valve in which the pilot valve is within the main valve head.
- 40** This subclass is indented under subclass 38. Subject matter in which the pilot valve is opened or closed by a lateral canting of the pilot valve causing the same to rock about a point of contact between the valve and its seat to one side of their center.
- 41** This subclass is indented under subclass 33. Subject matter in which the pilot valve or an actuator therefor is located elsewhere than on or immediately adjacent the main valve unit, thus allowing operation of the main valve from a station more accessible than is available at the location of the main valve.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 57, for fluid link or column actuators for valves.
- 131, for remote control of electrically actuated valves.
- 293, for valves having an extension for the actuator.
- 294, for valves having a flexible actuator.
- 295, for pedal actuated valves.
- 42** This subclass is indented under subclass 33. Subject matter in which means are provided for selectively setting the maximum opening of the main valve.
- (1) Note. The opening limit may be imposed by the mechanical blocking of the opening movement of the main valve or by some control exercised on the pilot valve.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 60, for adjustable limit stops for fluid pressure operated valves not of the servo type.
- 284+, for limit stops for valves of general types, and see the search notes thereto.

**43** This subclass is indented under subclass 33. Subject matter in which the main valve is subjected to a constantly acting force derived from the pressure of the flow line and tending to open the main valve.

- (1) Note. The line pressure tending to open the main valve may act directly on the seat closing element of the valve or may act on a separate pressure surface connected therewith, such as a piston or diaphragm.
- (2) Note. The line pressure opening force may be assisted or opposed by other mechanical loading, such as a spring.

**SEE OR SEARCH CLASS:**

137, Fluid Handling, subclass 464 for safety cut-off valves line pressure biased to open position and subclass 467 for fluid opened valves which require resetting.

**44** This subclass is indented under subclass 43. Subject matter in which the constantly applied line pressure tending to open the main valve is applied to the inner side of a separate connected fluid reaction surface, such as a piston or diaphragm, of larger diameter than the valve and located adjacent thereto on the inlet side of the valve, this being the side to which it moves in opening, whereby the resultant opening force due to line pressure is determined by the differential area between the diameter of the reaction surface and the diameter of the valve seat.

- (1) Note. The separate reaction surface may be the inner face of the upper end of a spool type element, the inner end surface of an inverted cup shaped valve element, an annular extension of the valve in the plane of its closing area, etc. In any case, the motion of the part of the valve which is in contact with the seat is against the flow.
- (2) Note. This type of valve is sometimes called "inlet peripheral type", as distinguished from the "inlet central" type of subclasses 43 and 46.

**SEE OR SEARCH CLASS:**

137, Fluid Handling, subclasses 494+ for line condition change responsive valves having separate connected fluid reactor surfaces, especially subclass 509 for such valves seating in the direction of flow.

**45** This subclass is indented under subclass 44. Subject matter in which the differential line pressure reacting surface is a flexible wall or membrane which is deflected by the applied fluid pressure.

**SEE OR SEARCH CLASS:**

92, Expansible Chamber Devices, subclasses 34+ for a bellows type expansible chamber device, and subclasses 90+, for a flexible wall type expansible chamber device.

137, Fluid Handling, subclass 510 for line condition change responsive valves which have a diaphragm or bellows type separate connected reactor and seat in the direction of flow.

**46** This subclass is indented under subclass 43. Subject matter in which the servo-motor is of the type using a flexible wall or membrane that is deflected by the applied servo pressure.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

61+, for diaphragm or bellows type fluid pressure valve actuators not of the servo type.

**SEE OR SEARCH CLASS:**

92, Expansible Chamber Devices, subclasses 34+ for a bellows type expansible chamber device, and subclasses 90+ for a flexible wall type expansible chamber device.

**47** This subclass is indented under subclass 25. Subject matter in which an expansible fluid chamber other than the servo motor has a fluid restricting flow passage in communication therewith and is associated with either the main or pilot valves to resist or retard their motions.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 36, for servo operated valves having separable dashpot chambers, in which the servo mechanism is of the choked pressure type.
- 48+, for dashpot or fluid controlled retarders or timers for valves which do not have pilot or servo mechanisms.

**48** This subclass is indented under subclass 12. Subject matter in which the valve is provided with a fluid reaction means that prescribes a rate of motion for, or an interval in, the operation of the valve.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 15+, for such devices in which the valve operating means is disconnected immediately after the operating force is applied or is overridden by the fluid reaction means, so that a predetermined flow is obtained before a compulsory cut-off.
- 36, and 47, for pilot or servo operated valves which have separate dashpots or choked fluid retarders.
- 64, for nonfluid timing or retarding means for valve actuators.

SEE OR SEARCH CLASS:

- 16, Miscellaneous Hardware, subclasses 49+ for liquid checks and closers, subclasses 66+ for pneumatic checks and closers, and subclass 84 for pneumatic closure checks.
- 137, Fluid Handling, subclasses 469+ for pop type safety valves, i.e., those in which a separate reactor surface affected by the relieved fluid modifies the response of the valve to the line condition change after the valve opens and subclasses 514+ for dashpot controlled direct response valves.
- 188, Brakes, subclasses 297+, for a dashpot or shock absorber of general utility.
- 267, Spring Devices, subclasses 64.11+, for fluid pressure springs.

**49**

This subclass is indented under subclass 48. Subject matter in which the fluid reaction means frees the valve from the restraining action of a catch or detent.

- (1) Note. The fluid reaction means may comprise an expansible chamber, a float chamber or a gravity tank which receives a diverted portion of the flow and actuates the latch or detent, thus relating the delay or control to the duration or quantity of the flow after release of the originating force.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 32, for latched pilot valves.
- 73, for fluid pressure released trips for valves in which the fluid pressure has no relation to the duration of flow in the line. See (1) Note.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclasses 386+ for controls which are responsive to the level of accumulated liquid which comprises the total flow or which act to maintain the level of an accumulation of liquid. See (1) Note.

**50**

This subclass is indented under subclass 48. Subject matter in which an expansible chamber device is in constantly open but restricted communication with the main flow line.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 33+, for choked pressure type servo-motor actuators for valves.

**51**

This subclass is indented under subclass 50. Subject matter in which means are provided to shunt fluid around or enlarge the restricted communication.

- (1) Note. Usually the shunt path is provided to permit unretarded motion of the valve in either its opening or closing movement while retarding the other movement.
- (2) Note. Frequently the shunt path is controlled by either a check valve or a cup

type of packing on the piston of the expansible chamber to produce a one-way retarding action on the valve.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 35, for choked pressure type servo-motor actuators for valves in which the choke passage varies according to the valve position.
- 55, for dashpots which are not line pressure connected, but which have choke by-pass or relief means.

**52** This subclass is indented under subclass 50. Subject matter in which fluid flows into the expansible chamber or dashpot during the closing movement of the valve.

**53** This subclass is indented under subclass 48. Subject matter in which fluid is diverted from the main flow line into a tank or receiving chamber at atmospheric pressure, which is so related to the valve in the main flow line that the collection of a sufficient quantity of fluid in the tank or receiver actuates or causes the actuation of the valve.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 49, for similar devices responsive to the accumulation of diverted fluid to release a latch or trip, and see the note and search notes to that subclass.

**SEE OR SEARCH CLASS:**

- 137, Fluid Handling, subclasses 396+ for self emptying tanks in which the main flow is controlled through the accumulation of fluid in the tank rather than the use of fluid diverted from the main flow line and subclasses 403+ for liquid level responsive or maintaining systems in which the weight of the accumulated fluid controls the accumulation thereof.

**54** This subclass is indented under subclass 48. Subject matter in which valve operation is affected by an isolated fluid flowing from an expansible chamber into a storage space from which it returns to fill the expansible chamber without co-mingling with other fluids.

- (1) Note. Frequently the isolated fluid is caused to flow from one side of a piston to the other.

- (2) Note. See the search notes to subclass 48 for related fields of search.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 48+, and 55, for dashpot utilizing unconfined atmospheric air as the fluid drawn into the expansible chamber.

**55** This subclass is indented under subclass 48. Subject matter in which a dashpot is filled with air drawn in from the surrounding air and either the inflow or outflow is restricted, means being provided to shunt fluid around the restricted communication on reverse flow.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 35, for choked pressure type servo-motor actuators for valves in which the choke passage varies according to the valve position.
- 51, for similar chambers which are line pressure connected.
- 54, for similar restricted and unrestricted flow paths for dashpots or choke chambers having a closed fluid circuit.

**56** This subclass is indented under subclass 12. Subject matter wherein the fluid pressure actuator gives more than one character of motion or operation to the valve.

- (1) Note. An example of plural operations would be rotating and raising a rotary valve, the raising being for the purpose of reducing friction while the valve is rotated.

**SEE OR SEARCH THIS CLASS, SUB-CLASS:**

- 157+, for plural mechanical operations including means to increase the head and seat contact pressure.
- 215+, for mechanical valve actuators giving more than one character of motion to the valve, and see the search notes thereto.

## SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 315.36 for a particular mechanical actuator providing plural motions of a valve flow control member with repair, tapping, assembly, or disassembly means, or subclasses 330-333 for a nonvalving motion of a valve or valve seat.

- 57** This subclass is indented under subclass 12. Subject matter wherein the fluid pressure actuator for the valve is connected by a closed fluid line to a control station at which is located a means for varying the pressure in the fluid line, which means takes the form of an expansible chamber device such as a pump, pulsator, piston and chamber or diaphragm and chamber.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

29, for fluid pressure actuated valves of the servo-motor type, the operation of which is controlled from a distant point by means of a valve for the power fluid, and subclass 41 for other types of remote pilot valve actuation.

131, for remote control of electrical valve actuators.

## SEE OR SEARCH CLASS:

60, Power Plants, subclasses 533+ for a fluid link or column, per se, or actuating a nominal load other than a valve.

137, Fluid Handling, subclasses 82+ for pressure modulating relays or followers including fluid links, but not including valve or the motor means which is actuated by it.

- 58** This subclass is indented under subclass 12. Subject matter wherein a mechanical movement is interposed between the fluid pressure actuator and the valve.

(1) Note. For the definition of a mechanical movement as used in connection with valve actuation, see subclass 213.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

138, for electrical valve actuators with interposed mechanical movements.

213+, for valve actuators comprising mechanical movements and see the search notes for other mechanical movement devices in connection with other types of valve actuation or fluid handling. See (1) Note. Search Class 137, Subclass.

505.46, and 505.47, for reactor surfaces operatedly connected to valves by mechanical movement.

## SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 104 for pulsator valves operated by suction, as in milker pulsators, with trip linkage.

- 59** This subclass is indented under subclass 12. Subject matter wherein the fluid pressure actuator comprises an impeller or vane mounted to turn or swing about a pivot in response to fluid flow or pressure and connected to actuate the valve.

## SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 332, for turbines connected to valves to give a non-valving motion and subclass 499 for turbine or swinging blade reactor surface connected to operate a line condition change responsive valve.

- 60** This subclass is indented under subclass 12. Subject matter wherein the actuator is provided with an adjustable stop to limit the actuator travel.

## SEE OR SEARCH THIS CLASS, SUBCLASS:

42, for adjustable limit stops for valves having choked pressure type servo-motor actuators.

89+, for valve actuators having means to hold the actuator in a desired position or prevent its use.

284+, for valves with nonfluid actuators provided with limit stops, and see the search notes thereto.

- 61** This subclass is indented under subclass 12. Subject matter in which the valve includes a reciprocating fluid control member and the actuator for such member comprises an expansible chamber device in which a portion of the expansible chamber of such device includes a

working member comprising a wall made of flexible material and the flexing of such wall in response to the application of fluid pressure to the chamber constitutes the movement which effects actuation of the control member.

- (1) Note. An “expansible chamber device” under this definition is a device in which the fluid actuating the expansible chamber device is disclosed as distinct from the fluid controlled by the control member of the valve; that is, a separate fluid or fluid valved from the controlled fluid is admitted to the expansible chamber to effect movement of the flexible wall structure. See the Search Class note below to Class 137, for devices excluded under this definition
- (2) Note. The patents in this and the indented subclasses are necessarily directed to a combination - the combination of a reciprocating valve and a flexible wall expansible chamber device. Because an expansible chamber device, per se, is classified in Class 92 where a comprehensive breakdown is provided, patents which disclose a specific Class 92 device in combination with a valve but do not claim such combination, and where the improvement is directed to the Class 92 device only, should not be cross-referenced into this and the indented subclasses. Rather, a cross-reference should be made to the appropriate subclass in Class 92.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 45, and 46, for choked fluid pressure type servo-motor actuators for valves in which there is a diaphragm or bellows in the operating mechanism.

SEE OR SEARCH CLASS:

- 92, Expansible Chamber Devices, subclasses 34+ for a bellows type expansible chamber device and subclasses 90+ for a flexible wall type expansible chamber device.
- 137, Fluid Handling, subclasses 494+, particularly subclass 505.36+ for a valve having a diaphragm as a reactor surface, subclass 510 for a valve wherein

a diaphragm or bellows actuator for the valve is at least partially deflected by fluid in response to a change in line condition of such fluid, and subclass 525 for valves of deformable material in which the restoring force of such material constitutes the biasing means for the valve.

**61.1** This subclass is indented under subclass 61. Subject matter in which the surface of the flexible wall working member outside the expansible chamber constitutes the movable control member which member is adapted to be moved to engage a valve seat.

**61.2** This subclass is indented under subclass 61. Subject matter in which the movable control member, the seat or port for such member and the flexible wall working member are positioned and aligned along the same axis.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

63.5+, for a valve having a coaxial valve actuator comprising an expansible chamber device having a cylinder with a relatively movable piston therein.

**61.3** This subclass is indented under subclass 61.2. Subject matter in which the control member is biased by spring means concentric with the axis of such member and positioned on the side of the control member opposite that of the flexible wall, the spring means acting between a fixed member and the control member.

**61.4** This subclass is indented under subclass 61.2. Subject matter in which the flexible wall or control member is biased by spring means concentric with the axis of the control member and positioned between the flexible wall and the control member, the spring means acting between a fixed member and the flexible wall or control member.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

63.6, for a valve and coaxial piston and cylinder expansible chamber spring valve actuator with a coaxial spring biasing means positioned between the valve and actuator.



**61.5** This subclass is indented under subclass 61.2. Subject matter in which the flexible wall member is biased by spring means concentric with the axis of the control member and in which the flexible wall member is positioned between such spring means and control member the spring means acting between a fixed member and the flexible wall.

**62** This subclass is indented under subclass 12. Subject matter in which the valve includes a reciprocating fluid control member and the actuator comprises an expansible chamber device having as a working member either a cylinder or a piston, relatively movable therein, the cylinder and piston forming an expansible chamber, the volume of the expansible chamber changing with a corresponding relative movement of the piston and cylinder in response to the supply of control fluid to the chamber, such relative movement effecting actuation of the control member.

(1) Note. The fluid actuating the expansible chamber device is distinct from the fluid controlled by the control member of the valve; that is a separate fluid or fluid valved from the controlled fluid is admitted to the expansible chamber to effect relative movement of the cylinder and piston. See the Search Class note below to Class 137 for devices excluded under this definition.

(2) Note. The patents in this and the indented subclasses are necessarily directed to a combination the combination of a reciprocating valve and an expansible chamber device, per se, is classified in Class 92 where a comprehensive breakdown is provided, patents which disclose a specific Class 92 device in combination with a valve, but do not claim such combination and where the improvement is directed to the Class 92 device only, should not be cross-referenced into this and the indented subclasses. Rather, a cross-reference should be made to the appropriate subclass in Class 92.

#### SEE OR SEARCH CLASS:

- 92, Expansible Chamber Devices, appropriate subclass for piston and cylinder structure.
- 137, Fluid Handling, subclasses 494+ for a valve having a separate connected fluid reactor surface.

**63** This subclass is indented under subclass 62. Subject matter wherein the piston and the valve forms a unitary structure.

**63.4** This subclass is indented under subclass 62. Subject matter in which working or movable member of the expansible chamber device is not rigidly secured to the movable control member but is capable of transmitting movement to such member through (1) direct engagement of separable engaging surfaces or (2) through a spring or other resilient means.

(1) Note. One of the separable engaging surfaces is carried on the cylinder, piston or piston rod of the expansible chamber device and the other is on the movable control member of the valve or actuating rod of the valve.

(2) Note. The spring or resilient means through which motion is transmitted is positioned between an element rigid with the movable working member of the expansible chamber device and an element rigid with the control member and is adapted to engage both.

#### SEE OR SEARCH CLASS:

- 92, Expansible Chamber Devices, subclass 84 for apparatus comprising a resilient means interposed between the working member of an expansible chamber device and a relatively movable power transmission element and subclass 129 for apparatus comprising an abutment connection between a working member and a power transmitting element.

**63.5** This subclass is indented under subclass 62. Subject matter in which the movable control member, the seat or port for such member, the cylinder of the expansible chamber device and

the piston relatively movable therein are positioned and aligned along the same axis.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

61.2, for a valve having a coaxial valve actuator comprising a flexible wall expansible chamber device.

- 63.6** This subclass is indented under subclass 63.5. Subject matter in which the movable working member of the expansible chamber device or the control member is biased by spring means concentric with the axis of the control member and positioned between the movable working member and control member, the spring means acting between a fixed member and the working member or control member.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

61.4, for a valve and coaxial flexible wall expansible chamber valve actuator with a coaxial spring biasing means positioned between the valve and actuator.

- 64** This subclass is indented under the class definition. Subject matter in which the actuator includes means, other than one utilizing a fluid, for retarding the motion of valve actuation.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

48+, for a valve having fluid retarder, and see the Search Notes thereto.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclasses 416+ for a quick acting float controlled valve, a period of delay usually preceding the quick action; subclass 435 for float arm operated means with a valve retarder; subclass 514 for a direct acting condition responsive valve having a retarder; subclasses 624.11+ for a programmer or nonfluid timer type actuator controlling a valve.
- 222, Dispensing, subclass 477 for retarded or delayed action discharge controller in a dispenser.

- 65** This subclass is indented under the class definition. Subject matter wherein the actuator for the valve includes a permanent magnet or a constantly energized electromagnet.

- (1) Note. The magnets to be found in this class are such that there is no means for varying their magnetic properties and the control is usually either by the movement of the magnet or by some control of the magnetic circuit outside of the magnet.

- 66** This subclass is indented under the class definition. Subject matter wherein the valve is provided with a biasing means for urging it in one direction, a latch holds the valve against the action of the biasing means and a trip is provided for releasing the latch so that the biasing means may move the valve.

- (1) Note. The latch may take the form of a collapsible toggle.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

89+, for valves having means for blocking or disabling the actuator.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclass 50 and 57 for trip devices which are actuated in response to excess speed of rotation of a shaft to permit a valve to open or close, subclasses 65+ for combustion failure responsive fuel safety cut-offs for burners, many of which involve trip type actuators, subclasses 67+ for destructible or deformable element control, many being biased trip devices subclass 104 for suction pulsator devices with trip linkage, subclass 417 for float controlled valves released by pilot floats, subclasses 420+ for trip mechanism in float controlled valves and subclass 456 for safety cut-offs requiring resetting, many being a trip type, especially subclass 463 for fluid released trip type safety cut-off valves requiring resetting.

- 67 This subclass is indented under subclass 66. Subject matter associated with means for normally actuating the port controller with trip device latched in its bias restraining position.
- 68 This subclass is indented under subclass 66. Subject matter wherein the means for actuating the trip is an electrical means.
- (1) Note. This subclass provides for explosive actuated trip devices which employ an electrically actuated igniter.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
129+, for electrically actuated valves and see the search notes thereto.
- 69 This subclass is indented under subclass 68. Subject matter wherein the trip is operated to actuate the valve when the electric power supply to the electrical means fails.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
27, for servo failure responsive control of a valve operated by a servo-motor.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclass 66 for thermoelectric type combustion failure responsive fuel safety cut-offs for burners.
- 70 This subclass is indented under subclass 68. Subject matter wherein an additional electrical means is provided for resetting the valve and/or trip.
- (1) Note. A usual arrangement is one wherein the additional electrical means draws the valve head back against the biasing means and wherein the latch then engages to hold the valve in the biased position until the trip is actuated.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclass 66 for thermoelectric control of resetting for combustion failure responsive fuel safety cut-offs for burners and subclasses 456+ for safety cut-offs which must be reset by external means,
- many of these devices being of the trip type.
- 71 This subclass is indented under subclass 70. Subject matter wherein the electrical valve actuating means includes a rotary electric motor.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
133+, for rotary electric motor valve actuators not of the trip type.
- 72 This subclass is indented under subclass 66. Subject matter wherein the biasing means for the trip or valve includes a gravity urged weight, which, when the latch is tripped, effects or assists the opening or closing of the valve.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
338, for weight biased valves, and see the search notes thereto.
- 73 This subclass is indented under subclass 66. Subject matter wherein the means for actuating the trip includes fluid pressure motive means.
- (1) Note. The trip may be actuated either by the application of a predetermined fluid pressure or by the decrease or failure of a fluid pressure.
- (2) Note. The pressure fluid may be obtained from fuel oxidized in a chamber.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
12+, for fluid pressure actuated valves.  
49, for dashpot type trip release in fluid actuated or retarded valves.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclasses 386+ and 393 for liquid level responsive devices in which a fluid pressure differential results from a vent closed by accumulated material and subclass 463 for fluid released trip type safety cut-off valves requiring resetting.

141, Fluent Material Handling, With Receiver or Receiver Coacting Means, subclasses 198+ for feed cut-off by rising liquid level in a filled receiver.

**74** This subclass is indented under subclass 66. Subject matter wherein the trip actuator includes a mechanical movement.

(1) Note. For a definition of a mechanical movement actuator, see subclass 213.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

213+, for mechanical movement actuated valves, and see the search notes thereto.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 420+ for trip-mechanism for quick acting float controlled valves.

**75** This subclass is indented under the class definition. Subject matter wherein the valve actuator is provided with means which will give the valve an accelerated or snap action during a part of its motion as compared to a relatively slow motion during another part of its motion.

(1) Note. By snap action is usually meant an arrangement wherein the actuation of the valve is first delayed while energy is stored in a spring or equivalent device and then the stored energy is released, such release taking place in a short time to provide a quick response of the actuated element.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

64, for valves with nonfluid timer or retarder, and see the search notes thereto for a general list of retarded valves.

66+, for biased trip type valves, including toggle type latch devices.

77+, for lost motion devices involving mere delay without a subsequent acceleration.

SEE OR SEARCH CLASS:

91, Motors: Expansible Chamber Type, subclasses 344+ for cyclically operable expansible chamber motors having snap action distributing valves.

137, Fluid Handling, subclasses 469+ for pop type safety valves.

222, Dispensing, subclasses 498+ for snap acting outlet elements for dispensers.

**76** This subclass is indented under the class definition. Subject matter wherein the valve actuator is of the type where a first element after a free movement strikes a second element and the impact thereof is the force which actuates the valve.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

77+, for apparatus wherein the lost motion actuation of the valve may result in an impact effect under some circumstances.

129+, for solenoid valve actuators where a gap normally occurs between the valve and armature in one position of the valve.

SEE OR SEARCH CLASS:

166, Wells, subclass 194 and the subclass there noted for a well apparatus comprising a valve actuated by a dropped ball or fluid driven piston.

**77** This subclass is indented under the class definition. Subject matter wherein the connection between the actuator and valve is such that during part of its valve-actuating travel the actuator or a part thereof may move without producing any movement of the valve.

(1) Note. Certain actuators wherein interruptions in the continuity of transmission of movement or energy to the valve are inherent in the law of operation of the mechanism, as in solenoids, ratchets, etc., are classified in succeeding subclasses on the basis of the particular actuator involved.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

75, for snap actuation mechanisms.

- 76, for impact actuation mechanisms.
- 129+, for solenoid valve actuators. See (1) Note.
- 157+, for lost motion connections between the actuator and the valve but also including means to increase the head and seat contact pressure operable during the period of lost motion.
- 230, for ratchet type mechanical movement actuators. See (1) Note.
- 249, for interrupted gearing mechanical movement actuators. See (1) Note.
- SEE OR SEARCH CLASS:**
- 137, Fluid Handling, subclass 243.3 for lost motion connections which permit the valve to be found on its seat, subclass 422 for lost motion in quick acting float controlled valves, subclass 474 for lost motion between a pop pressure reactor and a condition responsive valve, subclass 630.19+ for lost motion between a single actuator and a plurality of sequentially progressively operating valves.
- 78** This subclass is indented under subclass 77. Apparatus including a lost motion connection in the lever system.
- 79** This subclass is indented under subclass 77. Subject matter wherein the lost motion between the actuator and the valve is such that when the force transmitted between the actuator and the valve rises above a predetermined valve (1) the connection between the actuator and valve is broken and no further force is transmitted therebetween, or (2) the force transmitted therebetween is greatly reduced.
- SEE OR SEARCH CLASS:**
- 192, Clutches and Power-Stop Control, appropriate subclasses, especially subclasses 12+ for clutch and brake combinations and subclass 30+ for clutches, per se.
- 80** This subclass is indented under subclass 79. Subject matter wherein the lost motion connection between the actuator and the valve includes an elastic element.
- (1) Note. In order that the elastic element be so considered, its elastic properties must be used in producing the lost motion between actuator and valve.
- 81** This subclass is indented under subclass 79. Subject matter wherein the lost motion connection between the actuator and the valve includes a friction coupling or clutch.
- SEE OR SEARCH CLASS:**
- 192, Clutches and Power-Stop Control, appropriate subclasses, especially subclasses 12+ and 30+ for clutches combined with fluid couplings or brakes and clutches, per se.
- 82** This subclass is indented under subclass 77. Devices wherein the actuator is so connected to the valve that in its intermediate position it permits the valve to operate as a check valve and in its extreme positions it holds the valve open or closed.
- SEE OR SEARCH THIS CLASS, SUBCLASS:**
- 213+, 318+ and 336, for actuators which may contact a valve or part thereof to open or close it in opposition to its bias.
- 83** This subclass is indented under subclass 82. Devices wherein the movement of the valve is modified by a spring.
- 84** This subclass is indented under the class definition. Subject matter wherein the valve head is movably related to its stem or other immediately supporting element, there being no guide or link or other actuator in engagement with said stem or supporting element between the head and the movable connection, or with the head in such a way as to hold it in alignment with the seat.
- (1) Note. The movable connection may be of the universal, swivel or pivot type, the purpose being to let the valve head seat squarely even if the stem or other supporting element is not accurately aligned, or to allow the valve head to slip past projection in seating.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 40, for tilting concentric pilot valve in fluid servo-motor valve actuators.
- 157+, for relatively movable head and stem constructions for pressing heads to seats which permit alignment.

## SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclass 527.4 for direct-response, pivoted valves constructed to permit self adjustment.

**85** This subclass is indented under subclass 84. Devices in which the connection is resiliently yieldable.

**86** This subclass is indented under subclass 84. Devices in which the connection permits movement of the head in more than one direction.

**87** This subclass is indented under subclass 84. Devices in which a pivotal connection permits the head to swing in one plane only.

- (1) Note. The axis of the pivot is usually perpendicular to the axis of the valve stem.

**88** This subclass is indented under subclass 84. Devices in which the valve head rotates only, usually with the axis of the valve stem as the center of rotation.

**89** This subclass is indented under the class definition. Subject matter wherein means are provided for detaining, blocking or disabling a valve actuator, the actuator being restrained against motion away from the point at which the detent or holding means engages it.

- (1) Note. The blocking or disabling means of this subclass is not a part of the valve actuator and the unblocking or disabling does not actuate the valve.
- (2) Note. Valve actuating mechanisms having a separately actuated clutch which disables the mechanism are included.

## SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 66+, for valves provided with biased trips whose latches or detents are analogous to the blocking or disabling means above, and see the search notes to subclass 66.
- 79+, for yielding connectors, e.g., slip clutch, in a valve actuating mechanism. See (2) Note.
- 230, for ratchet operating mechanisms in which detents are used in holding valves between ratcheting.
- 284+, for limit stops for valve actuators, these preventing further motion in one direction but allowing retrograde movement, and see the search notes thereto.
- 297+, for frictional detents.

## SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, subclasses 527+, and all other appropriate subclasses for detents for control lever and linkage systems.
- 137, Fluid Handling, subclass 303 for means for disabling stop and waste valves in hydrants, as for summer conditions, subclasses 382+ for valve guards which prevent access to a valve or its actuator, subclasses 383+ for arrangements wherein the valve is locked or sealed against unauthorized use and subclasses 523+ for valves directly responsive to line condition change which are provided with means for latching them open.
- 222, Dispensing, subclass 43 and 44 for dispensers having discharge controlling stops and/or detents combined with indicating means.

**89.5** This subclass is indented under subclass 89. Subject matter wherein (1) the actuator which is detained, blocked or disabled includes a flow path section which is separable from the valved section or (2) the means which detains, blocks or disables the actuator includes a flow path section which is separable from the valved section or that structure which joins the separate sections.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
149.9, for separable flow path sections, the joining or disconnection thereof being blocked or disabled by a valve, or its actuator, in one section.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclass 614.06 for separable, valved, flow path sections with the means for coupling the sections interlocked with a valve or its actuator, and subclass 637.05 for separable, valved, flow path sections wherein the valve actuators are correlated.
- 90** This subclass is indented under subclass 89. Devices comprising a separate unit attached to a conventional valve structure.
- 91** This subclass is indented under subclass 90. Attachments wherein there is modification of the valve structure to receive the disabling unit.
- 92** This subclass is indented under subclass 90. Attachments wherein the valve has a limit stop which is retained in a fixed position by the direct engagement of the disabling means with some part of the stop.
- 93** This subclass is indented under subclass 92. Devices wherein the disabling means is fixedly attached to the valve stem or actuator.
- 94** This subclass is indented under subclass 89. Devices wherein the latch means is fluid pressure biased.
- 95** This subclass is indented under subclass 89. Devices wherein the means for blocking or disabling the handle is released by non-valving motion of the actuator.
- 96** This subclass is indented under subclass 95. Devices wherein the handle is linearly reciprocated to release the blocking means.
- 97** This subclass is indented under subclass 96. Devices wherein the latch connects the actuator to the body through the head. The actuator may be an integral part of the head.
- 98** This subclass is indented under subclass 95. Devices wherein an integral portion of a pivotally mounted handle serves as a blocking or disabling means.
- 99** This subclass is indented under subclass 98. Devices wherein the pivotally mounted handle is spring biased in the blocking or disabling position.
- 100** This subclass is indented under subclass 95. Devices wherein the handle is rotated about the axis of the valve stem to actuate the blocking or disabling means.
- 101** This subclass is indented under subclass 89. Devices wherein the manipulator for the disabling means is mounted on the handle or stem for movement independent of the handle or stem.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
93, for attachments mounted on the valve handle or stem.
- 102** This subclass is indented under subclass 101. Devices wherein the manipulator has constrained linear motion.
- 103** This subclass is indented under subclass 102. Devices wherein the linear movement of the manipulator operates a pivoted latch.
- 104** This subclass is indented under subclass 102. Devices wherein the latch is rigidly associated with the manipulator.
- 105** This subclass is indented under subclass 104. Devices wherein a distinct latch lug extends transverse to the line of movement of the manipulator.
- 106** This subclass is indented under subclass 102. Devices wherein the latch has movement transverse to the line of movement of the manipulator.
- 107** This subclass is indented under subclass 101. Devices wherein the latch is a pivoted member.

- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
93, for actuator latches that are mounted on the valve actuator.
- 108** This subclass is indented under subclass 107. Devices wherein the latch and manipulator are joined or made integral to form a single continuous member having at least one portion that is resilient and the pivot is a segment of the spring secured to the handle or stem. The latch moves in an arcuate path.
- 109** This subclass is indented under subclass 107. Devices wherein the latch is spring biased.
- 110** This subclass is indented under subclass 101. Devices wherein the latch has constrained linear motion.
- 111** This subclass is indented under subclass 89. Devices wherein the manipulator for the disabling means is mounted on the valve body.
- 112** This subclass is indented under subclass 111. Devices wherein a set screw is both latch and manipulator.
- 113** This subclass is indented under subclass 111. Devices wherein the manipulator has constrained linear motion and the latch is rigidly associated with the manipulator.
- 114** This subclass is indented under subclass 111. Devices wherein the latch is a pivoted member.
- 115** This subclass is indented under subclass 114. Devices wherein the latch and manipulator are joined or made integral to form a single continuous member having at least one portion that is resilient and the pivot is a segment of the spring secured to the body. The latch moves in an arcuate path.
- 116** This subclass is indented under subclass 114. Devices wherein the latch is spring biased.
- 117** This subclass is indented under the class definition. Subject matter wherein a restricted passage is provided in parallel to a main valve.
- (1) Note. The usual purpose of such restricted passage is either to provide a bleed across the valve to permit a minimum flow of current when the valve is closed or to equalize pressure across the valve.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
118+, for valves having a material guide or restrictor in series flow relation.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclasses 513.3 through 513.7 for a line condition direct response valve (i.e., check valve) having an open bleed port, subclass 599.17 for systems dividing into parallel flow lines then recombining having rotary plug flow control member having a variable restrictor, subclasses 601.18-601.19 for systems dividing into parallel flow lines then recombining having a material guide or restrictor, subclasses 625.28-625.39 for systems having a multi way valve unit with dividing into parallel flow lines with recombining, or subclasses 629-630.15 for systems having sequentially opening or closing of plural valves for pressure equalizing or auxiliary shunt flow.
- 118** This subclass is indented under the class definition. Subject matter wherein a restrictor or material flow guide other than a nozzle or outlet shape is provided in series with a valve.
- (1) Note. Since some restrictors, especially movable or adjustable types, differ from valves only in the intended use, the search should be continued in various serial valve categories. See especially the search notes in section 23 of the class definitions of Class 222, Dispensing.
- (2) Note. Many of these restrictors have silencing as their chief purpose.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
33+, for valves actuated by choked pressure type servo-motors, especially subclass 37 for such valves having a choke or restrictor in the main line.



- 216, for screw threads in a flow passage which will have inherently restricted properties.

**SEE OR SEARCH CLASS:**

- 137, Fluid Handling, subclasses 118.01 through 119.1 for self-controlled branched flow systems having plural outflows, subclasses 171-204 for diverse fluid containing pressure systems with fluid separating traps or vents, especially subclasses 175-176 for a choke or restricted passage gas bleed, subclasses 436-437 for a float arm operated valve for a liquid level responsive or maintaining system with a flow guide or restrictor, subclasses 544-550 for means for separating solid material from the fluid filters, subclasses 590-592 for distribution systems comprising a tank with an internally extending flow guide, subclass 599.17 for systems dividing into parallel flow lines then recombining having rotary plug flow control member having a variable restrictor, subclasses 601.18-601.19 for systems dividing into parallel flow lines then recombining having a material guide or restrictor or subclass 802 miscellaneous (e.g., dummy valve, outlet form, conduit form, material, valve body, etc.).
- 138, Pipes and Tubular Conduits, subclasses 40+ for flow restrictors in pipes and tubular conduits and subclass 46.5 for pipes with discharge deflectors.
- 166, Wells, subclass 91.1 for well heads with chokes or beans.
- 193, Conveyors, Chutes, Skids, Guides, and Ways, subclass 32 for conveyor chutes with retarders.
- 222, Dispensing, subclass 547 and 564 for dispensers having internal flow restrictors.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 380+, 399+, 461+, 553+, 575, and 590+ for spray nozzles combined with whirlers or other restrictors in the flow line or with external deflectors.

- 119** This subclass is indented under subclass 118. Devices in which the flow of fluid downstream of the valve is guided or restricted to produce a zone of low pressure which acts through a passage to return to the fluid material which has found its way into the valve stem passage.

- 120** This subclass is indented under subclass 118. Subject matter wherein the flow material guide or restrictor is movable with respect to the walls of the flow passage.

- (1) Note. For the purposes of this and indented subclasses the distinction between a movable restrictor and the valve is that in any of the normally occurring positions of a restrictor fluid will still flow. If in any normally occurring position the flow is completely arrested, the device is not a restrictor but a valve. However, the distinction cannot be made in many instances, and movable flow restrictors are frequently considered valves in this class. See the class definition.
- (2) Note. The movable restrictors of this subclass are either movably mounted or floating in the flow path or connected to a movable part of the valve, or made of resilient material.
- (3) Note. Guides which extend along a flow path from a valve head to keep the valve in alignment with its seat are not considered restrictors unless modified to control flow or turbulence, but are classified on the basis of the valve or its actuator or other appropriate basis.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 215+, and 264+, for screw actuators for valves.

**SEE OR SEARCH CLASS:**

- 137, Fluid Handling, subclasses 497+ for reaction members operating line condition responsive valves, the effect of such members being generally flow restricting, per se, subclass 525 for resilient material valves responding directly to line pressure and sub-

- classes 613+ for distribution systems comprising a single flow path with plural serial valves and/or closures.
- 138, Pipes and Tubular Conduits, subclass 43, 45 and 46 for pipes with variable flow restrictors.
- 121** This subclass is indented under subclass 120. Subject matter wherein the movable guide or restrictor is adjustable, i.e., may be put into a different position or relation with respect to its mounting and/or actuator for the purpose of securing a different character or rate of flow when flow subsequently occurs.
- (1) Note. See the class definition of Class 137, section 5, for search notes on manual valve actuation and adjusting.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
215+, and 264+, for screw actuators for valves, and see the search notes to subclass 264.
- SEE OR SEARCH CLASS:  
138, Pipes and Tubular Conduits, subclass 43, 45 and 46 for variable flow restrictors not combined with valves or distribution systems.
- 122** This subclass is indented under subclass 121. Devices in which the adjustable restrictor is a tapered plug which extends into the flow passage.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclass 625.3 for means to adjust flow through parallel passages in a movable flow-controlling element.
- 123** This subclass is indented under subclass 118. Subject matter wherein the restrictor comprises a contracted portion of the flow line and the valve is located at the point of greatest constriction of the flow line.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
24, for fluid actuated or retarded valves which are Venturi or flow line effect assisted.
- 37, for choked fluid pressure type servo-motor valve actuators with a main line having a choke or restriction.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclasses 219+ for Larner-Johnson valves, i.e., expansible chamber or internal telescoping valves, which are seated at a point of restriction in the line, subclasses 436+ for float operated valves having a restrictor, subclass 487 for pilot or servo control of a condition change responsive valve controlled by pressure differentials across the flow line valve, subclasses 500+ for condition responsive devices having separate connected reactor surface means responsive to rate of fluid flow, usually measured across a restriction and subclass 515 for drill pipe check valves.
- 124** This subclass is indented under subclass 123. Subject matter wherein the valve is placed in the throat of a Venturi tube and the point of valve location coincides with the point of greatest restriction of the Venturi.
- 125** This subclass is indented under subclass 118. Subject matter wherein the restrictor is such that with a constant flow of fluid thereto the stream flowing outwardly therefrom takes the form of drops.
- SEE OR SEARCH CLASS:  
222, Dispensing, subclass 420 for drop forming dispensers, and see the search notes thereto.
- 126** This subclass is indented under subclass 118. Subject matter wherein the guide or restrictor comprises means forming a passage which advances the material along the flow path while also causing it to travel around the circumference of a circular or conical core between guides applied to or formed by said core.
- SEE OR SEARCH CLASS:  
138, Pipes and Tubular Conduits, subclasses 42+ for pipes with restrictors in the form of a tortuous path.

- 127** This subclass is indented under subclass 118. Subject matter wherein the restricting means is of a form such that the fluid flow direction is changed at least twice in a plurality of stages.
- (1) Note. Typical of the restrictors to be found in this subclass are (1) restrictors comprising a plurality of baffle plates so arranged that the fluid flowing past them eddies or reverses its flow and (2) restrictors comprising a passage which is reversed back on itself a plurality of times to produce a number of reversals of flow greater than two.
- SEE OR SEARCH CLASS:
- 137, Fluid Handling, subclass 573 and 574 for plural series flow related tanks or compartments formed by baffles and/or providing for zigzag flow.
- 138, Pipes and Tubular Conduits, subclasses 42+ for pipes with flow restrictors in the form of a tortuous path.
- 128** This subclass is indented under the class definition. Subject matter wherein means are provided in connection with a detachable valve actuator, whereby a sealing member is brought into operable position to prevent leakage when the actuator is detached.
- (1) Note. The arrangement herein usually takes the form of a valving means for the opening through which the actuator passes which closes the opening when the actuator is detached from the main valve.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 291+, for valves having detachable actuators.
- 335.1+, for valves having a hermetic flexible wall seal for the actuator.
- SEE OR SEARCH CLASS:
- 137, Fluid Handling, subclass 285 for hydrants having a check valve to close the flow when the main valve is removed, subclasses 312+ for leakage or drip collectors for fluid handling devices and subclasses 613+ for serial valves in distribution systems one of which may be a repair closure for the other.
- 129.01 ELECTRICALLY ACTUATED VALVE:**
- This subclass is indented under the class definition. Subject matter comprising means in the form of a valve actuator which uses electrical energy to change the position of a movable element, i.e., a valve, to regulate or control the flow of a fluent material through a passage or opening.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 30.01+, for electromagnetically operated pilot valves for servo-motors for valve actuation.
- 68+, for electric trip actuation, including resetting, of biased trip type valves.
- SEE OR SEARCH CLASS:
- 123, Internal-Combustion Engines, subclass 90.11 for poppet valve operating mechanism which is electrically powered.
- 137, Fluid Handling, subclasses 65+ for solenoids controlling safety cut-off valves for oil burners, subclass 76 for heaters for destructible or fusible control elements, subclass 341 for fluid handling systems with electric heating elements, subclass 392 for liquid level control by electrical characteristic sensing, subclass 554 for electrical indicators for position or extent of motion or system parts, subclass 596.17 for electrically operated supply and exhaust valves, and subclass 625.65 for electrically operated supply and exhaust multiway valve units.
- 222, Dispensing, subclasses 333+ and 504 for motor operated discharge assistants and outlet elements.
- 129.02 With means to bias valve open:**
- This subclass is indented under subclass 129.01. Subject matter wherein a spring, fluid pressure, or other agent is used to maintain the valve in a position which allows the fluent material to flow through the passage until the valve actuator moves the valve to a position which closes the passage.

**129.03 With nonelectrical actuator:**

This subclass is indented under subclass 129.01. Subject matter also including an alternative actuator which does not require electrical energy to move the valve.

- (1) Note. Where both electrical and non-electrical mechanisms are present, but in which the mechanisms are not of themselves each capable of fully controlling the valve, the actuators are not considered to be alternative within the scope of this subclass and are classified in the appropriate subclass for the electrical actuation and cross referenced for novel nonelectrical actuation mechanisms. An example of such excluded device would be a trip released actuator with an electrical reset in subclasses 70+.
- (2) Note. See the class definition of Class 137 section 4 for search notes on multiple actuators.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 14, for fluid actuated valves having alternative nonfluid, including electrical, actuating means.
- 68+, for electrical trip actuation including electrical reset for valves, and see (1) Note above.

**129.04 Remote or follow-up control system for electrical actuator:**

This subclass is indented under subclass 129.01. Subject matter wherein an electrical control system is provided for controlling the valve actuator, which control system is either: (a) an electrical system including means interposed between an operator control station which is far removed from the valve actuator or (b) an arrangement such that movement of a control member will result in an equal or proportional movement of a controlled member.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 41, for remote control of choked pressure type servo-motor valve actuators.
- 57, for fluid link type remote actuators for valves, and see the search notes to these subclasses.

SEE OR SEARCH CLASS:

- 318, Electricity: Motive Power Systems, subclasses 560+ for electric motor position servomechanism; appropriate subclasses for remotely controlled electric motors.

**129.05 Having means to produce digital pulses:**

This subclass is indented under subclass 129.01. Subject matter wherein the valve actuator includes means for providing discrete pulses of electrical energy, i.e., "off" or "on", or "0" or "1" electrical signals.

**129.06 Having element dimensionally responsive to field:**

This subclass is indented under subclass 129.01. Subject matter wherein a dimension of the valve or actuator changes in size when subjected to a magnetic or an electrical field to thereby control the flow of the fluent material.

**129.07 Balanced valve:**

This subclass is indented under subclass 129.01. Subject matter which includes means for equalizing pressures acting on the valve or valve actuator whereby minimal electrical energy is required to move the valve to a desired position.

**129.08 Having means to produce proportional flow:**

This subclass is indented under subclass 129.01. Subject matter which includes means for moving the valve a distance which is in proportion to the magnitude of the electrical energy supplied, or to regulate the flow in proportion to the magnitude of the electrical energy supplied.

**129.09 Solenoid having plural coils:**

This subclass is indented under subclass 129.01. Subject matter wherein the valve actuator includes a solenoid or reciprocating type of electrical valve actuator which has at least two spiral electrical windings, each winding being wound about an imaginary center line.

**129.10 Coils have common axis:**

This subclass is indented under subclass 129.09. Subject matter wherein at least two of the windings have the same imaginary center line.

**129.11 Rotary electric actuator:**

This subclass is indented under subclass 129.01. Subject matter wherein the valve actuator is of a type which rotates to actuate the valve.

SEE OR SEARCH THIS CLASS, SUBCLASS:

71, for rotary electric motor means for resetting a bias trip type valve.

**129.12 With limit control:**

This subclass is indented under subclass 129.11. Subject matter wherein the rotary valve actuator is provided with means for regulating the actuator at a predetermined point in the operation of the actuator to disable or otherwise control the actuator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

284+, for limit stops for valves, and see the search notes thereto.

**129.13 With speed or braking control:**

This subclass is indented under subclass 129.11. Subject matter wherein a control means is provided for either regulating or slowing down the speed of the rotary valve actuator.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 47+ for speed responsive valve control.

**129.14 Freely rotatable ball valve:**

This subclass is indented under subclass 129.01. Subject matter wherein the valve is a spherical member which is mounted so that the member can turn in any direction during actuation.

**129.15 Including solenoid:**

This subclass is indented under subclass 129.01. Subject matter wherein the valve actuator comprises a winding or coil and a metal core or armature, i.e., a solenoid, the coil and armature mounted for relative movement when the coil is energized.

**129.16 Having plate-shape armature:**

This subclass is indented under subclass 129.15. Subject matter wherein the armature is circular metal disc or other relatively thin metal

body mounted for reciprocation in the direction of its thinnest dimension.

**129.17 Having diaphragm between coil and opening controlled:**

This subclass is indented under subclass 129.15. Subject matter which includes a membranous member which separates the coil from the opening controlled by the valve.

**129.18 With means to adjust stroke of armature:**

This subclass is indented under subclass 129.15. Subject matter which includes a membranous member which separates the coil from the opening controlled by the valve.

**129.19 Lost motion between valve and valve actuator:**

This subclass is indented under subclass 129.15. Subject matter which includes means which provides for movement of either the valve or the valve actuator while the other is stationary during a portion of the time of actuation.

**129.20 Mechanical movement between valve and solenoid:**

This subclass is indented under subclass 129.15. Subject matter wherein a mechanical movement is provided between the valve and solenoid.

SEE OR SEARCH THIS CLASS, SUBCLASS:

58, for fluid actuated valves having a mechanical movement between the actuator and the valve.

213+, for mechanical movement actuators for valves in general, and see the search notes thereto.

**129.21 Coil surrounds valve port or flow line:**

This subclass is indented under subclass 129.15. Subject matter wherein the coil is arranged around the passage so that flow is through the coil.

(1) Note. The passage may be a valve port adjunct.

(2) Note. The incidental heat exchange resulting from this arrangement is not sufficient basis for classification as a heat exchange device.

**SEE OR SEARCH CLASS:**

137, Fluid Handling, subclass 341 for electric heating elements for fluid handling systems, and see the search notes thereto. See (2) Note.

**129.22 Solenoid within flow line:**

This subclass is indented under subclass 129.15. Subject matter wherein the passage is external to and surrounds the solenoid.

- (1) Note. The passage may be a valve port adjunct.
- (2) Note. The incidental heat exchange resulting from this arrangement is not sufficient basis for classification as a heat exchange device.

**SEE OR SEARCH CLASS:**

137, Fluid Handling, subclass 341 for electric heating elements for fluid handling systems, and see the search notes thereto. See (2) Note.

- 142** This subclass is indented under the class definition. Subject matter in combination with a flow path wherein the combination relationship is specifically set forth.

**SEE OR SEARCH CLASS:**

- 137, Fluid Handling, subclasses 561+ for distribution systems including details of the flow path which go beyond the cooperative relation thereof with a valve or its actuator, and subclasses 798+ for a flow line coupling forming part of a fluid handling system.
- 138, Pipes and Tubular Conduits, subclass 43, 45 and 46 for a flow pipe with variable restrictor.

- 143** This subclass is indented under subclass 142. Subject matter wherein the combination relationship includes means for mounting the valve on, or supporting it from, the flow path.

**SEE OR SEARCH CLASS:**

137, Fluid Handling, subclass 507 for reactor surface type condition responsive valves with means for mounting them in the system.

- 144** This subclass is indented under subclass 142. Subject matter wherein the flow path is a tank.

**SEE OR SEARCH CLASS:**

- 137, Fluid Handling, subclasses 123+ for tanks combined with siphons, especially subclass 151 for valves or closures in the siphon flow path, subclasses 219+ for Lerner-Johnson type valves, in which a telescoping valve member lies inside the flow path, subclasses 255+ for plural tanks with parallel flow, subclasses 317+ for means for tapping a tank or keg under pressure, subclasses 373 and 376 for tank supports, subclasses 386+ for liquid level response or maintenance, subclass 548 for valved tank inlets or outlets provided with a strainer, subclasses 571+ for plural tanks connected in series, subclass 581 for movable tanks, subclasses 582 to 616+ for tanks with movable, plural, internally extended and other special forms of inlet and outlet, subclasses 624.11+ for a distribution system including a programmer or a timer and subclasses 625+ for a multi-way valve unit.
- 222, Dispensing, subclasses 420 through 574 for dispensing tanks of the gravity type.
- 285, Pipe Joints or Couplings, subclasses 149.1+ for a pipe or cable and box coupling, subclasses 136.1+ for a pipe or rod-to-pipe-to-plate coupling, and subclasses 189+ for a pipe end-to-plate coupling, especially subclass 193 wherein the pipe end is a faucet part.

- 145** This subclass is indented under subclass 142. Subject matter wherein the valve controls a flow path which is located on the side of a pipe, the valve being secured or applied to the side of the pipe or comprising a unitary flow passage and controller applied to an outlet in the circumferential wall of the pipe.

**SEE OR SEARCH CLASS:**

137, Fluid Handling, subclass 143 for siphon venting or breaking, subclasses 173+, 177+, 197+ and 203 for

outlets for either gas or liquids in fluid separating traps, subclasses 216+ for back-flow preventing air vents in liquid flow lines, subclasses 272+ for hydrant valves in water mains, especially subclass 299 for valves for hydrant outlets, subclasses 317+ for devices for tapping a pipe under pressure, subclass 480 for auxiliary inlet valves in combustion engine induction lines, subclasses 596+ for distribution systems involving drain or stop and waste valves, and see the search notes thereto and subclasses 872+ for distribution systems having a flow control means for plural passages comprising a valve or deflector at the junction of such passages.

**146** This subclass is indented under subclass 145. Subject matter wherein the valve and/or mounting is made in parts to clamp around the pipe.

**147** This subclass is indented under subclass 142. Subject matter wherein the flow path is a pipe, the closing-element seating against the end thereof or against a seat surrounding or immediately within the end.

SEE OR SEARCH THIS CLASS, SUBCLASS:

299+, for pivoted valves mounted externally of the valve body.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 223+ for tire filling chucks and/or stems, subclasses 409+ for float controlled valves, especially subclasses 442+ for terminal float arm operated valves of the reciprocating type, subclasses 469+ for pop type safety valves and subclass 562 and 603 for faucet attached flow elements.

**148** This subclass is indented under subclass 142. Subject matter wherein the flow path includes a pipe coupling or union.

SEE OR SEARCH THIS CLASS, SUBCLASS:

149+, for a valved pipe joint wherein the valve is operated by the coupling act.

149.9, for a valve pipe joint wherein the valve, or its actuator, is interlocked with the coupling means.

155+, for valves combined with nozzles and spouts, and see the search notes thereto.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 231 for a coupling means for an inflatable article (e.g., tire filling chuck, tire filling stem, etc.), subclasses 315.01-329.4 for a fluid handling system with repair, tapping, assembly, or disassembly means, subclasses 479-484 for a valve responsive to induction from an internal combustion engine, subclasses 515-515.7 for a direct response valve (i.e., check valve) in couplings for coaxial conduits (e.g., drill pipe check valve, safety valve, etc.), subclasses 614-614.06 for a flow line section with serial valves or closures having a separable flow line section, valve, or closure in each separable, valved, flow line sections, or subclass 637.05 for valves with separate, correlated actuators correlated across a separable flow line joint.

141, Fluent Material Handling, With Receiver or Receiver Coacting Means, subclass 335, 336, 348+, and 351+ for a valved joint between a portable supply and a receiver, the valve being operated by the act of connecting or disconnecting them.

**149** This subclass is indented under subclass 142. Subject matter wherein the closing element is carried by one flow path section, the joining or disconnecting of another flow path section with respect thereto serving to operate the closing-element.

SEE OR SEARCH THIS CLASS, SUBCLASS:

89.5, for valve actuator blocking or disabling means including a flow path joint.

339, for valve actuating devices extending through the fluid inlet or outlet.

340, for valve actuators surrounding the flow conduit.

- 341+, for valve actuators comprising the valve casing or an extension thereof.  
 349+, for valve actuators comprising the inlet outlet for the valve casing.

**SEE OR SEARCH CLASS:**

- 137, Fluid Handling, subclasses 223 through 234.5 for an inflatable article (e.g., tire filling chuck or stem, etc.), subclass 599.02 for systems dividing into parallel flow lines then recombining having a valved flow line coupling actuated by joining or parting (e.g., quick disconnect hose, etc.), or subclass 614.05 for systems having flow line with serial valves or closures where a valve or closure is operated by coupling.  
 141, Fluent Material Handling, With Receiver or Receiver Coacting Means, subclasses 348+ for supply means carried receiver flow control opening means, and subclasses 351+ for receiver actuated supply discharge means.

- 149.1** This subclass is indented under subclass 149. Subject matter wherein the flow path sections are moved in such a manner as to have a linear component of motion with respect to each other, this motion of the sections serving to operate the closing-element.

**SEE OR SEARCH CLASS:**

- 137, Fluid Handling, subclasses 614.03+ for separable valved, flow path sections, for valve in each section being operated by a linear component of coupling motion of the sections.

- 149.2** This subclass is indented under subclass 149.1. Subject matter wherein the closing-element is mounted for rotating or hinging motion.

- 149.3** This subclass is indented under subclass 149.1. Subject matter wherein the closing-element moves transversely to, or in the opposite direction of, the linear component of motion of the flow path sections.

- 149.4** This subclass is indented under subclass 149.1. Subject matter wherein the means for joining the flow path sections includes a screw thimble or equivalent structure, the act of turning the

screw thimble in the making of the joint resulting in the linear component of motion.

**SEE OR SEARCH CLASS:**

- 285, Pipe Joints or Couplings, subclass 354 and 386+ for screw thimble type pipe joints.

- 149.5** This subclass is indented under subclass 149.1. Subject matter wherein the flow path sections are joined by the act of rotating one section with respect to the other, the rotation resulting in the linear component of motion.

- 149.6** This subclass is indented under subclass 149.1. Subject matter wherein the closing-element is spring biased and this spring opposes the linear component of motion.

- 149.7** This subclass is indented under subclass 149.6. Subject matter wherein no means, other than that which will release upon application of excessive forces, is included for holding the flow path sections against the spring bias.

**SEE OR SEARCH CLASS:**

- 285, Pipe Joints or Couplings, subclass 9 and 304 for contact only and for friction detent type pipe joints respectively.

- 149.8** This subclass is indented under subclass 142. Subject matter wherein the closing-element and flow path are relatively movable, the closing-element being operated as the result of imparting motion to the flow path.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 149+, for a separable, valved, flow path wherein the valve is operated by the act of coupling the flow path sections.

**SEE OR SEARCH CLASS:**

- 137, Fluid Handling, subclasses 355.18 through 315.19 for a hose storage or retrieval means having a flow regulation means responsive to hose movement, subclass 515 for a line condition changed direct response valve (i.e., check valve type) in a coupling for coaxial conduits (e.g., drill pipe check valve, etc.), subclass 599.02 for systems dividing into par-



- allel flow lines then recombining having a valved flow line coupling actuated by joining or parting (e.g., quick disconnect hose, etc.), or subclass 616 for distribution systems having an articulated or swinging flow conduit that actuates a valve.
- 166, Wells, subclass 334.1 and the subclasses there noted for well devices with valves actuated by movement of the conduit carrying the valve, and see subclass 316 for the line between Classes 166 and 251.
- 222, Dispensing, subclasses 526+ for movable material discharge guides having various valve means associated therewith.
- 149.9** This subclass is indented under subclass 142. Subject matter wherein the closing-element is carried by one flow path section and another flow path section is detachably joined thereto, operation of the closing-element to a particular position being a prerequisite to attaching or detaching the joined sections.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
89.5, for a valve in one flow path section, a second flow path section detachably connected to the first section and means associated with the connecting means for blocking or disabling the valve actuator.
- 150** This subclass is indented under subclass 148. Subject matter wherein the pipe coupling allows adjustable positioning of the valve and coupled conduits.
- 151** This subclass is indented under subclass 148. Subject matter wherein the pipe coupling may be assembled with the conduits without rotation of said conduits.
- SEE OR SEARCH CLASS:  
285, Pipe Joints or Couplings, appropriate subclasses, especially subclass 304 for a friction detent coupling, and subclasses 305+ for a coupling having holding means comprising an essential catch, for pipe joints and couplings, per se.
- 152** This subclass is indented under subclass 148. Devices in which the valve seat and a pipe coupling element are a unitary subassembly.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclasses 15.08 through 15.17 for a process of cleaning, repairing, or assembling by securing, replacing or servicing a pipe, joint, valve, or tank.
- 153** This subclass is indented under subclass 142. Subject matter wherein the outlet or inlet is extended away from the valve or is provided with a means for deflecting the fluid stream.
- (1) Note. In order to come within the purview of this or the indented subclasses the particular feature of the outlet or the inlet must be definitely claimed.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
118+, for valved flow paths combined with material guides or restrictors other than nozzle or outlet shapes and see the search notes thereto.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclass 299 for valved hydrant outlets and subclasses 590+ for distribution systems comprising a tank with internally extending flow guides.  
220, Receptacles, subclasses 86.1+ for tank filling attachments.  
222, Dispensing, subclasses 519 through 540 for dispenser outlet guides combined with valves, subclasses 547 and 564 for dispensers with interior material guides, and subclasses 566+ for dispenser nozzles, spouts and pouring devices.
- 154** This subclass is indented under subclass 153. Subject matter wherein a surface is provided at an angle, i.e., not parallel to the outlet stream and against which the outlet stream is impinged.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclass 431 for a float surrounding an inlet pipe and

- acting as a spreader for the flow, subclass 437 for external hood or deflector surrounding a float-controlled inlet and subclasses 872+ for deflectors at junctions in connection with flow control means for plural passages.
- 138, Pipes and Tubular Conduits, subclass 46.5 for pipes and tubular conduits with discharge deflectors.
- 193, Conveyors, Chutes, Skids, Guides, and Ways, appropriate subclasses, for conveyor type chutes.
- 222, Dispensing, subclasses 566+ for dispensing nozzles, spouts and pouring devices.
- 239, Fluid Sprinkling, Spraying, and Diffusing, subclasses 380+ and subclasses 498-524 for spray devices combined with solid surfaces against which the fluid stream is impinged.
- 406, Conveyors: Fluid Current, subclasses 157+ for material dischargers for pneumatic conveyors.
- 155** This subclass is indented under subclass 153. Subject matter wherein the outlet is a terminal element, i.e., a nozzle or spout, either for inlet or outlet purposes.
- SEE OR SEARCH CLASS:
- 137, Fluid Handling, subclasses 872+ for deflectors including spouts at junctions, in connection with flow control means for plural passages in distribution systems, subclasses 615+ for articulated and swinging conduits, including nozzles and spouts, comprised in distribution systems and subclass 801 for nozzles and spouts, per se, and see the search notes thereto.
- 222, Dispensing, subclasses 526+ for movable spouts for dispensers and subclasses 566+ for dispensing nozzles, spouts and pouring devices, and see section 19 of the class definition of Class 222.
- 156** This subclass is indented under subclass 155. Devices wherein the actuator is related to the outlet in such a manner that the valve may be actuated by a receiver which is presented to the nozzle to receive the discharge from the nozzle.
- 157** This subclass is indented under the class definition. Devices which have means other than that which actuates or biases to valve open or closed position, to increase the contact pressure between valve and seat.
- SEE OR SEARCH THIS CLASS, SUBCLASS:
- 56, for fluid actuated plural operations including means to increase the head and seat contact pressure.
- SEE OR SEARCH CLASS:
- 137, Fluid Handling, subclass 246.2 for this means combined with means for liquid sealing at the valve interface.
- 158** This subclass is indented under subclass 157. Devices having means to also positively return the valve or seat from its extra seat or head contacting condition.
- SEE OR SEARCH CLASS:
- 137, Fluid Handling, subclass 246.18 and 246.19 for means for reducing the pressure in combination with liquid sealing at the valve interface.
- 159** This subclass is indented under subclass 158. Devices in which the seat is pressed against the valve head.
- 160** This subclass is indented under subclass 158. Subject matter wherein the valve member is of the rotary type, e.g., plug or disk.
- 161** This subclass is indented under subclass 160. Subject matter wherein the means to increase the seating pressure is operated by means independent of the means actuating the valve.
- SEE OR SEARCH CLASS:
- 137, Fluid Handling, subclasses 637+ for a plurality of valves in a distribution system provided with individual actuator mechanisms.
- 162** This subclass is indented under subclass 160. Subject matter wherein the means to increase and/or to reduce the seating pressure comprises cam or wedge means.

	SEE OR SEARCH THIS CLASS, SUB-CLASS: 203+, for other gate valves provided with cam or wedge means that increase the seating pressure only.		cable having a particular associated mounting or retaining means.
<b>163</b>	This subclass is indented under subclass 162. Subject matter having the cam or wedge means within the valve housing.	<b>172</b>	This subclass is indented under subclass 170. Devices applied by fluid pressure.
<b>164</b>	This subclass is indented under subclass 160. Subject matter wherein the means to increase and reduce the seating pressure comprises screw means.	<b>173</b>	This subclass is indented under subclass 172. Devices in which the valve is of the butterfly type.
<b>165</b>	This subclass is indented under subclass 164. Subject matter wherein the actuator does not reciprocate with actuation.		SEE OR SEARCH THIS CLASS, SUB-CLASS: 305+, for other butterfly valves.
<b>166</b>	This subclass is indented under subclass 165. Subject matter wherein a clutch or slip coupling is provided between the actuator and the valve to permit the valve to be relieved of the additional seating pressure before actuation or to increase the seating pressure after actuation.	<b>174</b>	This subclass is indented under subclass 170. Devices the seat being spring pressed.
<b>167</b>	This subclass is indented under subclass 158. Devices the valve being bifaced with pressing means for both faces.	<b>175</b>	This subclass is indented under subclass 157. Devices in which the means comprises fluid pressure.
<b>168</b>	This subclass is indented under subclass 167. Devices comprising threaded means between the valve face elements and their carrier.	<b>176</b>	This subclass is indented under subclass 157. Subject matter including a spring to press the head to the seat.
<b>169</b>	This subclass is indented under subclass 167. Devices wherein the means comprises toggle mechanism.	<b>177</b>	This subclass is indented under subclass 176. Devices the valve being of the pivoted type.
<b>170</b>	This subclass is indented under subclass 157. Devices having means to press or urge a seat against a valve head.	<b>178</b>	This subclass is indented under subclass 177. Devices the valve head having two seating faces which seat on oppositely disposed seats in a single flow line.
<b>171</b>	This subclass is indented under subclass 170. Subject matter comprising compressible packing constituting a valve seat which is compressed by a packing gland-like element.	<b>179</b>	This subclass is indented under subclass 177. Devices in which the valve is mounted externally of the valve body.
	SEE OR SEARCH CLASS: 277, Seal for a Joint or Juncture, for a generic sealing means or process, subclasses 637+ for a static contact seal for other than an internal combustion engine, or a pipe, conduit, or	<b>180</b>	This subclass is indented under subclass 176. Subject matter wherein the valve is of the rotary type.
		<b>181</b>	This subclass is indented under subclass 180. Subject matter wherein the valve is a rotary plug.
		<b>182</b>	This subclass is indented under subclass 181. Subject matter wherein the spring expands separable sections which comprise the valve head.
		<b>183</b>	This subclass is indented under subclass 181. Subject matter wherein the spring is enclosed by the valve housing or by an auxiliary spring housing.

- 184** This subclass is indented under subclass 183. Subject matter wherein the spring is between the plug and the actuating means or at that end of the plug having the actuator.
- 185** This subclass is indented under subclass 180. Subject matter wherein the pressing means comprises a spring exposed to the line flow.
- 186** This subclass is indented under subclass 176. Devices of the piston type.
- 187** This subclass is indented under subclass 157. Devices comprising a different actuating means for valving and pressing motion, or different functions of the same actuator.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
161, for independent actuation of both pressure increase and pressure reduction.
- 188** This subclass is indented under subclass 187. Subject matter wherein the valve is of the rotary type.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
161, for similar independent actuators in rotary valves but which also provided for positive reduction of the seating pressure, and see the search notes to subclass 161.
- 189** This subclass is indented under subclass 187. Subject matter comprising piston type valves provided with expansible packing.
- SEE OR SEARCH CLASS:  
277, Seal for a Joint or Juncture, for a generic sealing means or process, subclasses 637+ for a static contact seal for other than an internal combustion engine, or a pipe, conduit, or cable having a particular associated mounting or retaining means.
- 190** This subclass is indented under subclass 157. Subject matter wherein the valve is of the piston type.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclass 538 for line condition change responsive piston valves, and subclasses 625.37+ for piston valves where the flow is divided and recombined.
- 191** This subclass is indented under subclass 190. Subject matter wherein the piston rings or the packing upon closing of the valve are expanded.
- SEE OR SEARCH CLASS:  
277, Seal for a Joint or Juncture, for a generic sealing means or process, subclasses 637+ for a static contact seal for other than an internal combustion engine, or a pipe, conduit, or cable having a particular associated mounting or retaining means.
- 192** This subclass is indented under subclass 157. Subject matter comprising rotary valves.
- 193** This subclass is indented under subclass 157. Devices applied to a gate valve to move its face element in a direction lateral to that of movement of a valve element carrier toward the valve seat.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
177+, for pivoted gates with spring means to increase head and seat contact pressure.
- 194** This subclass is indented under subclass 193. Devices comprising a screw actuator so associated with the valve faces and the means to press them to their seats that it alone causes relative movement of them.
- 195** This subclass is indented under subclass 193. Devices for valve being bifaced with pressing means for both faces.
- 196** This subclass is indented under subclass 195. Devices the valve head having also a flow passage the boundary of which is expanded when the valve is in open position.

- 197** This subclass is indented under subclass 195. Devices which are carried by an expander which continues its movement after the face elements have been stopped by contact with the valve body.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
204, for similar structures in single-faced gates.
- 198** This subclass is indented under subclass 197. Devices including also a second expanding surface which comes into play as the valve approaches or reaches the limit of its closing movement.
- (1) Note. This second expanding surface is usually either a part of a carried expander as in subclass 200 or is fixed to the valve casing as in subclass 202.
- 199** This subclass is indented under subclass 197. Devices in which the valve face movement is stopped by direct contact with the valve casing at a position other than the valve seat.
- 200** This subclass is indented under subclass 195. Devices in which an expander element is brought into operation by contact with the valve body before the face elements have reached their furthestmost closing positions.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
198, for carried expanders combined with expanders which move after the faces are stopped.
- 201** This subclass is indented under subclass 200. Devices in which the expander pivots on contacting the valve casing.
- 202** This subclass is indented under subclass 195. Devices in which the valve faces are moved into contact with an expanding surface which is relatively fixed to the valve casing.
- 203** This subclass is indented under subclass 193. Subject matter wherein the means to press the valve to its seat includes a wedge or cam.
- 204** This subclass is indented under subclass 203. Subject matter wherein the wedge or cam moves with respect to both the head and seat.
- (1) Note. For mere adjustment of the cam or wedge with respect to the seat, see subclass 203.
- 205** This subclass is indented under the class definition. Devices which include flow controllers provided with means for micro-adjustment of the flow selectively between minimum and maximum extremes.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
122, for selective controllers in series, one of which is a valve.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclass 625.3 for valves which vary the flow through plural paths simultaneously.
- 206** This subclass is indented under subclass 205. Devices in which the means for varying the flow includes a plurality of passages through the valve head each being of a different size from the others.
- 207** This subclass is indented under subclass 206. Devices in which the valve is of the plug type.
- 208** This subclass is indented under subclass 205. Devices in which the flow controller is a rotary valve.
- 209** This subclass is indented under subclass 208. Devices in which the valve is of the plug type.
- 210** This subclass is indented under the class definition. Devices in which a single flow line has a plurality of serially associated flow controlling positions which are sequentially closed or opened by a valve unit.
- (1) Note. Included herein as such are anti-scoring means wherein one valve seat or head is protected from wire drawing by the control of the flow by a second valve until the first valve is fully opened or closed.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

118+, for anti-scoring means where the flow is controlled by a restrictor until the valve is fully opened or closed.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 625.39 for similar structures which also include dividing and recombining of the flow and subclasses 627.5 and 628+ for sequential actuation of plural valves.

**211** This subclass is indented under the class definition. Valve units comprising a single flow path provided with a pair of serially arranged seat members with which plural seat-engaging elements of a single valve head alternately cooperate.

**212** This subclass is indented under the class definition. Devices constructed of a plurality of relatively movable flow obstructing elements, which collectively close a single port.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

1.1, for plural annular segments constructed to close about a rod or pipe.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclasses 229+ for iris diaphragms for pre-photocell light control.

359, Optics: Systems (Including Communication) and Elements, subclasses 227+ for light control by means of movable opaque elements.

**213** This subclass is indented under the class definition. Subject matter wherein a valve is actuated by mechanical movement means, i.e., means comprising two or more fixed and movable parts so combined that the motion of one compels or completely controls or constrains motion of the other according to a law of operation inherent in and depending on the nature of the combination.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

58, for mechanical movements between a fluid pressure actuator and a valve.

66+, for biased trip valves and see the search notes thereto.

74, for mechanical movements to actuate a biased trip mechanism.

75, for snap actuated mechanisms for valve actuation.

76, for valve actuators comprising impact devices.

77+, for valve actuators in which lost motion is inherent.

294, for flexible actuators, as Bowden wires and chains.

295, for pedal actuators for valves.

336+, for biased valves.

340, 341+ and 349+, for actuators which are a part of the flow line.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, appropriate subclasses, for mechanical movements, per se.

137, Fluid Handling, subclass 315.14 for a fluid handling system with assembling, disassembling, mounting, or removing a faucet having a particular mechanical actuator, subclasses 315.35-315.4 for a particular mechanical actuator of a valve with repair, tapping, assembly, or disassembly means, subclasses 434-451 for a float arm operated valve, subclass 513 for plural mechanically interconnected check valves, subclass 601.12 for systems dividing into parallel flow lines then recombining including valves having a common operator therefor and mechanical motion of actuator for other than a rotary valve, subclass 601.15 for systems dividing into parallel flow lines then recombining having a mechanical motion of a valve actuator, or subclass 625-625.5 for a fluid handling system having a multi way valve that may include a mechanical movement.

222, Dispensing, subclasses 505+ for relatively movable actuators for dispenser valves.

267, Spring Devices, subclass 123, for a fluid spring device of the diaphragm type, useful in valve actuation.

- 214** This subclass is indented under subclass 213. Devices wherein the valve stem and/or actuator is particularly associated with means to pack or seal it to prevent leakage of fluid between the inside and outside of the valve body (e.g., as where the actuating screw threads are enveloped by the packing).

**SEE OR SEARCH CLASS:**

- 137, Fluid Handling, subclass 315.28 for a reciprocating valve having a particularly packed or sealed mechanical movement actuator with assembling or disassembling means.
- 277, Seal for a Joint or Junction, for a generic sealing means or process, subclasses 500+ for a dynamic, circumferential, contact seal for other than a piston.

- 215** This subclass is indented under subclass 213. Subject matter wherein the mechanical movement produces plural motions of the valves or valve components which motions are concurrent or consecutive.

- (1) Note. An example of a mechanical movement which produces plural concurrent motions of a valve is one wherein the valve element is mounted on a screw device. Actuation of the screw both rotates and reciprocates the valve element.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 56, for plural movements of a fluid pressure operated valve.
- 84+, for valve heads movably connected to the stem or support so that they can accommodate themselves to the seat.

**SEE OR SEARCH CLASS:**

- 123, Internal-Combustion Engines, subclasses 90.28+, for poppet valve operating mechanism which provides for nonvalving movement of the valve.
- 137, Fluid Handling, subclasses 330 through 333 for nonvalving motion of a valve or valve seat, subclass 315.36 for a particular mechanical actuator providing plural motions of a valve flow control member with

repair, tapping, assembly, or disassembly means, subclass 873 for movable deflector-spouts, in a lateral port of a fluid flow line, having plural motions, or subclass 616.3 for a valve having plural motions actuated by an articulated or swinging flow conduit.

- 216** This subclass is indented under subclass 215. Devices in which the thread element of at least one part of the screw is structurally a part of the valve controlled passage so that it is contacted by the fluid in the passage.

- 217** This subclass is indented under subclass 215. Devices wherein the valve head is mounted on the valve stem between the screw threads and the handle or other actuator.

- 218** This subclass is indented under subclass 215. Devices in which the coacting mechanical movement elements are completely enclosed within the valve body.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

- 214, for packed or sealed valve stems wherein some special relationship exists between the elements of the valve and the sealing means.
- 274+, for similar structure having valve heads which have a single motion.

- 219** This subclass is indented under subclass 218. Devices in which the actuator is connected to a screw element of the valve by threadless, longitudinally splined, or slip coupling means.

- 220** This subclass is indented under subclass 219. Devices in which the coupling socket is formed in the screw element.

- 221** This subclass is indented under subclass 218. Devices in which one of cooperating thread elements is formed within or upon a sleeve-like element which is detachable or removable from the valve body.

**SEE OR SEARCH CLASS:**

- 137, Fluid Handling, subclass 243.5 for actuators of this type having special provision for grinding the valve on its seat.

**222** This subclass is indented under subclass 221. Devices in which the sleeve is removably mounted in the bonnet.

**223** This subclass is indented under subclass 221. Devices in which the bonnet is threaded and thus becomes the sleeve.

**224** This subclass is indented under subclass 221. Devices in which the sleeve is mounted by an integral flange extending between adjacent body sections, usually the bonnet and the body.

**225** This subclass is indented under subclass 215. Device in which one of the cooperating thread elements is formed within or upon a sleeve-like element which is detachable or removable from the valve body.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

221, for removable sleeves encased in the valve casing.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 243.5 for actuators of this type having special provision for grinding the valve on its seat.

**226** This subclass is indented under subclass 215. Devices in which means are provided to bias the valve to open or closed position.

**227** This subclass is indented under subclass 226. Devices in which the biasing means is a spring.

**228** This subclass is indented under subclass 213. Devices in which a reciprocating stem is connected to or associated with a pivoted valve whereby reciprocation of the stem operates the valve.

**229** This subclass is indented under subclass 213. Subject matter wherein two or more motions involving different mechanical movements cause operation of the valve.

(1) Note. The plural dissimilar mechanical movements may comprise a single actuating means, or a plurality of independent or interconnected actuating means.

(2) Note. The use of a flexible member, such as a cable, chain or rope, attached to a valve operating mechanical movement is not considered to comprise two mechanical movements for classification herein. Such mechanisms are classified in the appropriate following mechanical movement subclasses and cross-referenced as required in subclass 294.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

294, for devices in which a flexible member, such as a cable, chain or rope is attached to an arm which is connected directly to the valve or valve stem. See (2) Note.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 446 for float arm actuated valves having an interposed cam, gear or screw mechanical movement.

**230** This subclass is indented under subclass 213. Subject matter wherein the valve actuation means includes an intermittent grip device of the pawl and ratchet type to convert a motion of an operating member to a one-way motion of the valve in the direction desired.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclasses 111+ for mechanical movements of the intermittent grip type.

**231** This subclass is indented under subclass 213. Subject matter wherein the mechanical movement actuator includes an elongated rigid means pivoted at one point to a support and having the actuating power and the valve connection at two other points.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, appropriate subclasses, for mechanical movement actuators including a lever.

137, Fluid Handling, subclass 315.37 for a particular lever type actuator of a valve with repair, tapping, assembly, or disassembly means, or subclasses 434-451 for a float arm operated



- valve, especially subclass 445 for a float arm operated valve having a toggle or second lever connected to the valve.
- 232** This subclass is indented under subclass 231. Apparatus comprising a plurality of serially related levers generally with pivot pin connections to each other and to the valve.
- 233** This subclass is indented under subclass 231. Subject matter wherein the lever is so arranged that its effective length varies as the lever swings through its actuating range, to vary the relation between effective force and the resistance of the actuated valve at various stages of its movement.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
237+, for levers having sliding contact wherein there is no appreciable mechanical advantage obtained by the sliding contact.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclass 531 for valves having direct response to condition change in which a reciprocating valve has a variable lever arm biasing means.
- 234** This subclass is indented under subclass 231. Subject matter wherein means are provided for adjusting the fulcrum of the lever or the length of the lever with relation to the fulcrum and/or valve, the adjustment being made during non-operative periods and not being affected by the valve actuating operation.
- (1) Note. See the class definition of Class 137, section 5, for search notes on manual valve actuation and adjustment of valve actuating means.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclass 426 for float operative valves with level adjusting or selecting means.
- 235** This subclass is indented under subclass 231. Apparatus wherein there is included a swivel connection in the lever mechanism.
- 236** This subclass is indented under subclass 231. Apparatus having the valve biased either to open or to closed position.
- 237** This subclass is indented under subclass 236. Valves wherein the three points are in a common plane and there is an unrestrained sliding connection between the valve and the elongated rigid means; the sliding contact herein affords no appreciable mechanical advantage.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
233, for devices having leverage variable during operation.
- 238** This subclass is indented under subclass 237. Valves wherein the valve is spring biased.
- 239** This subclass is indented under subclass 238. Valves wherein the spring is co-axial with the valve stem.
- 240** This subclass is indented under subclass 239. Valves wherein the spring reacts with a stop (e.g., a collar) on the valve stem and the valve is pulled to its seat.
- 241** This subclass is indented under subclass 239. Valves wherein the spring reacts with the guide for the valve stem.
- 242** This subclass is indented under subclass 236. Apparatus wherein the bias is provided by spring means.
- 243** This subclass is indented under subclass 242. Apparatus wherein the spring co-acts with or through the lever to provide the bias to the valve.
- 244** This subclass is indented under subclass 242. Apparatus wherein the spring is co-axial with the valve stem.
- 245** This subclass is indented under subclass 244. Apparatus wherein the spring abuts a stop (e.g., a collar) on the valve stem and thereby the valve head is pulled to its seat.

- 246** This subclass is indented under subclass 244. Apparatus wherein the spring abuts the guide for the valve stem and thereby the valve head is pushed to its seat.
- 247** This subclass is indented under subclass 236. Apparatus wherein the bias is provided by gravity.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
338, for other weight biased valves.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclasses 519+ and 532+ for direct response valves which are weight biased.
- 248** This subclass is indented under subclass 213. Subject matter wherein the mechanical movement actuator includes (1) relatively movable toothed members, round, linear or irregular, which transmit motion by meshing of the teeth during travel of the members, and (2) friction gearing, in which the members lack teeth, and force is transmitted by pressing one moving surface against the other, including those having one endless flexible member or belt.
- SEE OR SEARCH CLASS:  
74, Machine Element or Mechanism, subclasses 640+ for gearing, per se.  
137, Fluid Handling, subclass 446 for float arm actuated valves having an interposed gear.  
475, Planetary Gear Transmission Systems or Components, for planetary gearing, per se.
- 249** This subclass is indented under subclass 248. Subject matter wherein the gearing provides for interrupted or intermittent motion, caused by gear having irregular or discontinuously spaced teeth or indentations.
- SEE OR SEARCH CLASS:  
74, Machine Element or Mechanism, subclass 435, 436 and 437 for mutilated and Geneva gearing, per se.
- 249.5** This subclass is indented under subclass 248. Subject matter wherein the gearing includes a rotary member having coaxial, helical thread means on its outer surface meshing with gear means.
- 250** This subclass is indented under subclass 248. Subject matter wherein the gearing includes a straight bar with teeth on one face.
- 250.5** This subclass is indented under subclass 248. Subject matter wherein the gearing includes meshing segments or sectors.
- 251** This subclass is indented under subclass 213. Subject matter wherein the mechanical movement actuator comprises an eccentrically mounted rotating or swinging member, the varying radii of which produce varying positions of the valve.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
213+, for movements consisting of a rotatable element provided with a helical rib or groove and another element co-acting therewith through a pin or the like, engaging said groove or rib.
- SEE OR SEARCH CLASS:  
74, Machine Element or Mechanism, appropriate subclasses under mechanical movements, for cam type movements and subclasses 567+ for cams, per se.  
137, Fluid Handling, subclass 315.39 for a particular cam type actuator of a valve with repair, tapping, assembly, or disassembly means, or subclass 446 for a float arm actuated valve with interposed cam, gear, or threaded connection.
- 252** This subclass is indented under subclass 251. Devices comprising a helical rib or surface the longitudinal axis of which is co-axial with or parallel to the axis along which the valve reciprocates.
- 253** This subclass is indented under subclass 252. Devices in which the valve has one position which it will maintain under the influence of a spring or weight which comprises a biasing means.

**254** This subclass is indented under subclass 253. Devices having plural cam surfaces arranged for actuation by selective rotation in opposite angular directions.

**255** This subclass is indented under subclass 254. Devices in which the external means includes a handle which is rotatable but does not reciprocate.

**256** This subclass is indented under subclass 253. Subject matter wherein the cam means is housed by the valve body or bonnet.

**257** This subclass is indented under subclass 251. Devices in which the cam elements are encased within the valve body structure with a seal or packing externally of the elements.

**SEE OR SEARCH CLASS:**

277, Seal for a Joint or Juncture, for a generic sealing means or process, subclasses 628+ for a static contact seal for other than an internal combustion engine, or a pipe, conduit, or cable.

**258** This subclass is indented under subclass 257. Devices in which the cam element has symmetrically arranged cam surfaces which permit actuation of the valve by rotation of an actuating stem in either of two directions.

**259** This subclass is indented under subclass 257. Devices in which the cam is a finger like element which extends from a rotating shaft at right angles to its axis.

(1) Note. The patents in this subclass differ from those in subclasses 237+ in that in the former the operating handle and the cam element are longitudinally spaced on the shaft, while in the latter the operating handle, the cam element and the pivot all operate in the same plane.

**260** This subclass is indented under subclass 257. Subject matter wherein the cam comprises a rock shaft which has an off-set rod-like portion that has an axis perpendicular to the axis of the valve head.

**261** This subclass is indented under subclass 257. Subject matter wherein the cam comprises a rock shaft which has an off-set rod-like portion that has an axis perpendicular to the axis of the valve head, the off-set portion being connected to the rock shaft by two arms (i.e., U-shaped).

**262** This subclass is indented under subclass 251. Devices in which the valve has one position which it will maintain under the influence of a spring or weight which comprises a biasing means.

**263** This subclass is indented under subclass 262. Devices in which the biasing means is a spring.

**264** This subclass is indented under subclass 213. Subject matter wherein the mechanical movement comprises means having a continuous helical rib which is operable to reciprocate the movable valve member through connecting means but which does not impart the rotary motion of the screw to the valve member.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

82+, for screw actuated valves wherein the actuator is nonpositively connected to the valve head so that there is manual control in both closed and open position.

84+, for valve heads movably connected to the stem for accommodation to the valve seat.

215+, for screw type actuators in which the rotary movement of the screw is transmitted to the movable valve member.

**SEE OR SEARCH CLASS:**

137, Fluid Handling, subclass 315.4 for a particular screw type actuator of a valve with repair, tapping, assembly, or disassembly means.

**265** This subclass is indented under subclass 264. Devices having plural sets of threads which coact to accelerate the motion of the valve head.

**266** This subclass is indented under subclass 264. Devices in which the actuation initiating portion of the screw has only rotary motion.

- 267** This subclass is indented under subclass 266. Devices which are internally threaded.
- 268** This subclass is indented under subclass 267. Subject matter wherein the actuator has a cup-shaped end with internal threads therein and the cup-shaped end encloses the end of the valve stem.
- 269** This subclass is indented under subclass 268. Subject matter wherein the actuator is mounted in a bushing which is separable from the valve bonnet and/or body.
- 270** This subclass is indented under subclass 266. Devices in which the internally threaded valve actuating portion is restrained against rotation by co-action with guide structure which is removable from the body structure.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
221+, for removable guides associated with plural motion valves.
- 271** This subclass is indented under subclass 270. Subject matter wherein the actuator is resiliently mounted.
- 272** This subclass is indented under subclass 266. Devices in which the valve is biased in one direction of movement.
- 273** This subclass is indented under subclass 264. Devices having its thread element mounted in a recess or a ring for cooperation with an external thread on the valve body.
- 274** This subclass is indented under subclass 264. Devices in which the screw elements are completely enclosed within the valve body.
- 275** This subclass is indented under subclass 274. Devices which are biased to open or closed position.
- 276** This subclass is indented under subclass 275. Subject matter wherein the biasing means is a spring.
- 277** This subclass is indented under subclass 264. Devices wherein the valve is biased to open or closed position.
- 278** This subclass is indented under subclass 277. Devices in which there is biasing means comprising a spring.
- 279** This subclass is indented under subclass 213. Subject matter wherein the motion between the operator and valve is transmitted through a system of rods or bars jointed together and more or less constrained to transmit motion in a particular manner by having a rod or rods fixed.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclass 445 for float arm operated valves having toggles or plural levers included in the actuating means.
- 280** This subclass is indented under subclass 279. Apparatus including toggle mechanism.
- 281** This subclass is indented under the class definition. Subject matter wherein the valve is so related to the fluid controlled that the pressure bias imparted by the line pressure is balanced by opposing surfaces related to the valve, so that the effect of the line pressure tending to open or close the valve is cancelled out at least in part and a lesser external force is necessary to actuate the valve.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
305+, for butterfly valves.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclass 196 for systems having a fluid separating trap or vent using a level responsive pressure balanced liquid outlet valve, subclasses 219-222 for Larner-Johnson type valves that may include an inherent balance, subclass 289 for a hydrant having a balanced valve, subclass 450 for a liquid level responsive or maintaining system using a float arm operated balanced valve, subclasses 494-510 for line condition responsive valves having a separate connected reactor surface, subclass 601.02 for systems dividing into parallel flow lines then recombining including balanced valves having a common operator therefor, subclasses

- 625.28-625.39 for valves balanced by dividing the flow into branches which co-act with opposing surfaces, subclasses 628-630.22, especially subclasses 630.19-630.22 for balanced spool type valves having heads with relative movement with respect to each other or subclasses 629-630.15 for valves balanced by admitting fluid to a low pressure side before an opening force is applied to the valve, and see the references thereunder.
- 282** This subclass is indented under subclass 281. Valves wherein the valve has a linear motion to and from flow obstructing position.
- 283** This subclass is indented under subclass 281. Valves in which the valve unit rotates.
- 284** This subclass is indented under the class definition. Subject matter wherein means is provided with which the valve or valve actuator comes into contact to arrest its motion, the means being in the nature of an abutment or stop.
- (1) Note. The mounting and actuation means of the valve must be such that the motion controlled could be continued at least to some extent in the absence of the stop.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 42, for adjustable opening limit means for a valve having a choked pressure type servo-motor actuator.
- 60, for adjustable stops for fluid pressure actuated valves.
- 89+, for means for blocking or holding the actuator at some desired point or points, this means preventing motion in either direction, and see the search notes thereto.
- 129.12, for limit control means for electrically actuated valves.
- 285** This subclass is indented under subclass 284. Devices in which the position of the stop may be varied.
- 286** This subclass is indented under subclass 284. Devices associated with a rotary valve.
- 287** This subclass is indented under subclass 286. Devices in which one of the stop elements is on the head or is an integral part thereof.
- 288** This subclass is indented under subclass 286. Devices in which one of the stop elements is on the actuator or is an integral part thereof.
- 289** This subclass is indented under the class definition. Subject matter wherein the valve is provided with means so that it may be actuated from any of a plurality of positions, the plural possibilities existing at the same time.
- (1) Note. An example of such an arrangement is one wherein a valve under the floor of a railroad car is arranged with a long actuator so that it may be actuated from either side of the car.
- (2) Note. See the class definition of Class 137, section 4, for search notes on plural actuators in this class.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:
- 66+, for trip actuated valves.
- 235, for levers with swiveled mountings which permit actuation from plural positions.
- 290, for devices in which the actuator mounting may be shifted with reference to the valve so that it is accessible from different positions to perform the same operation, only one position being available at any given adjustment.
- 293, wherein an extension is attached to the valve handle, and wherein the valve may be actuated by the handle, as well as by the extension.
- SEE OR SEARCH CLASS:
- 137, Fluid Handling, subclasses 65+ for biased trip controlled valves, in which the trip actuator and the manual or other reset means are actuated from different positions.
- 290** This subclass is indented under the class definition. Subject matter wherein the valve or its actuator is provided with means such that either may have a plurality of neutral positions

and such plural neutral positions are subject to selection.

- (1) Note. The reason for such arrangements usually is so that the valve or its actuator may be mounted in different positions, as required by the location or the convenience of the operator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 289, for plural actuators or actuators accessible from plural positions, and see the notes thereto.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclasses 269+ for convertible devices involving choice between positions but requiring disassembly for making the change.

- 291** This subclass is indented under the class definition. Subject matter wherein the valve is provided with actuating means which is normally detachable or disengageable from the valve.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 128, for detachable valve actuating means having additional fluid sealing means which is brought into position to prevent leakage upon detachment of the actuator.  
293, for valve actuators comprising a handle and an extension therefor, the valve being actable by either the handle or the extension.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclasses 320+ for devices for opening a valve in a container under pressure, the device comprising a separable fluid conduit or tap and valve actuating means carried thereby, subclasses 365+ for valve wells with means to center the casing on the valve, this being done to facilitate connection of a removable actuator, and subclass 382.5 for detachable actuators having a key-like connection through a shielding casing with a valve or valve stem.

- 292** This subclass is indented under subclass 291. Devices wherein an actuator may be reciprocated along its axis to engage or disengage with a rotatable valve. The actuator is normally biased out of engagement with the valve whereby rotation of the actuator will not rotate the valve.

- 293** This subclass is indented under the class definition. Subject matter wherein an additional actuating means is attached to the usual valve operating means whereby the valve may be actuated from a remote point, or wherein means are provided in connection with the usual valve operating means to adapt it for the attachment of an extension.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 41, and 57, for remote control of fluid pressure operated valves, and see the search notes to these subclasses.  
229, for valve actuating means including two or more valve operators having dissimilar mechanical movements.  
291+, for valves having detachable actuators, the part associated with the valve not being actuable manually when the separable part is removed, and see the search notes thereto.  
294, for flexible actuators for valves.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclasses 272+ for hydrants, in which the below-ground valve requires an extended actuating means and subclasses 343+ and principally subclasses 363+ for valves associated with static constructional installation which frequently involve extension operators.

- 294** This subclass is indented under the class definition. Subject matter wherein the valve actuator is made of a material or the parts thereof are connected in such a manner as to permit ready flexing, bending or bowing.

- (1) Note. Examples of flexible actuators are Bowden wires, chains, ropes, etc.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

293, for other extension means for valve actuators.

SEE OR SEARCH CLASS:

74, Machine Element or Mechanism, subclasses 500.5+ for flexible control means, per se.

222, Dispensing, subclass 45 for flexibly connected indicator and dispenser element.

**295** This subclass is indented under the class definition. Subject matter wherein the actuator for the valve is a pedal actuator.

(1) Note. In order that the actuator be considered a pedal actuator, some significant feature which makes the actuator peculiarly designed to be operated by the foot or leg should be set forth.

SEE OR SEARCH CLASS:

4, Baths, Closets, Sinks, and Spittoons, subclass 280 and 308 for pedal operated water closet and spittoon valves.

74, Machine Element or Mechanism, subclasses 512+ for foot operated control lever and linkage systems and subclasses 560+ for pedals, per se.

137, Fluid Handling, subclass 354 for fluid handling devices having a part mounted on the floor of a motor vehicle.

222, Dispensing, subclass 179 for dispensers with pedal control of the discharge means.

**296** This subclass is indented under the class definition. Subject matter wherein the actuator has more than one character or direction of motion, as rotating and reciprocating, horizontal and vertical, which motions are performed in sequence in the same valve actuating operation.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

213+, for valves with mechanical movement actuators, especially subclasses 215+ for plural motions of a valve having a

mechanical movement actuator, e.g., screw actuated valves.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 315.36 for a particular mechanical actuator providing plural motions of a valve flow control member with repair, tapping, assembly, or disassembly means, or subclasses 636-636.4 for plural valves actuated by different motions of the same actuator.

**297** This subclass is indented under the class definition. Devices with frictional means to resist movement of the actuator.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

89+, for means for blocking or disabling an actuator.

**298** This subclass is indented under the class definition. Devices in which the valve swings around the means by which it is mounted on the valve seat or casing.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

177+, for pivoted valves with means to increase head and seat contact pressure.

228, for pivoted valves with reciprocating actuators.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 448 for float arm actuated pivoted valves, subclasses 520 and 521 for biased open, direct response valves, subclasses 527+ for other direct response pivoted valves and subclasses 625.44+ for multiway pivoted valves.

**299** This subclass is indented under subclass 298. Devices in which the valve is mounted externally of the valve body and controls flow through the inlet or outlet.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 614.01 for separable, valved, flow path sections wherein the closing-members seat against the same faces as those which

abut when the sections are joined, the closing-members usually being in the nature of pivoted, terminal valves.

- 300** This subclass is indented under subclass 299. Devices wherein the valve moves across the end of the inlet or outlet.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

349+, for valves in which the actuator is the inlet or outlet and the flow controller is a terminal gate.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 15.22 for a process of assembling, disassembling, or repairing a ball valve or rotary valve.

- 301** This subclass is indented under subclass 298. Devices wherein the valve moves transversely of the flow passage.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

212, for iris diaphragm type valves.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 15.22 for a process of assembling, disassembling, or repairing a ball valve or rotary valve, or subclass 625.45 for a multi way pivoted gate valve.

- 302** This subclass is indented under subclass 301. Devices wherein the valve head has two seating faces which seat simultaneously on oppositely disposed seats in a single flow line.

- 303** This subclass is indented under subclass 298. Devices in which the valve has one position which it will maintain under the influence of a constant force which comprises a biasing means, and force must be applied to the valve in order to have it take a different position.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 520, 521 and 527.8 for direct response pivoted valves.

- 304** This subclass is indented under the class definition. Subject matter comprising a valve head which only rotates about its axis and has a flow passage within it.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

149.2, for rotary valves wherein the rotation is the result of a linear motion of one flow path section with respect to another in the act of joining the sections.

160+, 180+, 188, and 192, for rotary valves having means to increase the head and seat contact pressure.

207, through 209, for rotary valves with graduated ports.

283, for balanced rotary valves.

286+, for rotary valves with limit stops.

292, for rotary valves with detachable actuators.

345, for rotary valves actuated by the valve casing.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 56 for a speed responsive valve control centrifugal mass, exclusive of liquid, rotating valve, and rotating governor, subclass 250 for a horizontally moving rotary valve having a liquid seal, subclass 311 for a rotary reversing valve regenerative furnace type, subclass 447 for a liquid level response or maintaining system using a float arm actuated rotary valve, subclasses 601.16-601.17 for systems dividing into parallel flow lines then recombining having a rotary valve, subclass 616.7 for systems where an articulated or swinging flow conduit actuates a rotary valve, subclasses 625.15-625.16 for a rotary multi way valve unit having sequentially progressive opening and closing valves of plural ports with subsequent closing of the first port, subclasses 625.21-625.24 for a rotary multi way valve unit having supply and exhaust, subclasses 625.34-625.36 for systems having a reciprocating spool multi way valve unit where flow divides into parallel flow lines then recombines, subclass



- 625.41 for a rotary multi way valve unit with a multiple inlet and a single outlet, subclasses 625.46-625.47 for a rotary multi way valve unit, or subclass 630.21 for lost motion sequentially opening or closing rotary concentric valves.
- 305** This subclass is indented under subclass 304. Devices wherein the pivot is centrally located in the valve member, providing oppositely directed radial wings.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
173, for valves of this type having fluid pressure means to press the seat to the valve.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclass 15.25 for a process of assembling, disassembling, or repairing a butterfly valve.
- 306** This subclass is indented under subclass 305. Devices providing a sealing material or element carried by the valve head, by the valve seat or by both.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclass 315.23 for means to assemble or disassemble a butterfly valve having a head or seat packing.  
277, Seal for a Joint or Juncture, for a generic sealing means or process, subclasses 628+ for a static contact seal for other than an internal combustion engine, or a pipe, conduit, or cable.
- 307** This subclass is indented under subclass 306. Devices in which the packing is adjustable to facilitate its original installation or to provide take-up for wear.
- 308** This subclass is indented under subclass 305. Devices providing the means for attaching the valve stem, or pivot, to the valve head.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclass 315.24 for means to assemble or disassemble a butterfly valve having a connection between a valve head and stem.
- 309** This subclass is indented under subclass 304. Subject matter wherein the valve rotates about its own axis, has a flow passage through it and at least the inlet or outlet of that passage is transverse to the axis of rotation and is formed in a seat contacting portion.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclass 15.24 for a process of assembling, disassembling, or repairing a plug valve, or subclasses 315.25-315.26 for a plug valve with assembly or disassembly means.
- 310** This subclass is indented under subclass 309. Devices in which there is a passage which extends both radially and longitudinally through the valve head.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclass 625.24 for stop and waste valve units having axially and radially extending passages in the plug.
- 311** This subclass is indented under subclass 310. Devices in which the valve head has at least two radially extending passages, one an inlet and one an outlet, connected by a longitudinally extending passage.
- 312** This subclass is indented under subclass 309. Subject matter wherein the means for holding the head in the body is on the same side of the head as the valve actuator.
- 313** This subclass is indented under subclass 304. Devices in which means are provided to bias the valve to open or closed position.
- 314** **Seat or interface seat:**  
This subclass is indented under subclass 304. Subject matter comprising a valving element which cooperates with a seat or a seal interposed between the seat and the valving element.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclasses 315.19 through 315.22 for assembling or disassembling a rotary ball valve having

a particular valve seat or interface seal therefor.

- 277, Seal for a Joint or Juncture, for a generic sealing means or process, subclasses 628+ for a static contact seal for other than an internal combustion engine, or a pipe, conduit, or cable.

### **315.01 Ball valve:**

This subclass is indented under subclass 304. Rotary valve comprising a housing having a flow passage therethrough and a valve seat; with a spherical head that contacts the seat and can be rotated about an axis passing generally through its geometrical center by an actuating means.

- (1) Note. Patents to be classified in the subclasses "Ball valve" to "With removable trunnion cover" of this Class 251 subclasses 315.01-315.09 and "Ball construction" of this Class 251 subclass 315.16 are properly classified when placed in the appropriate subclasses "Housing construction" of this Class 251 subclasses 315.1-315.15. For example, claims to a ceramic housing assembled around the valve head would be classified in this Class 251 subclass 315.04 for the original reference and cross-references of this Class 251 subclass 315.13.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclass 15.22 for a process of assembling, disassembling, or repairing a ball valve or rotary ball valve.

### **315.02 Having a particular hardness (i.e., durometric property):**

This subclass is indented under subclass 315.01. Subject matter which relates to the durability of the ball valve.

### **315.03 Of specific material:**

This subclass is indented under subclass 315.01. Ball valve fabricated from a particular composition.

- (1) Note. Mere recitation of a material without particular significance attributed to the valve would not be classified in this subclass.

### **315.04 Ceramic (e.g., glass or fired clay):**

This subclass is indented under subclass 315.03. Material which is hard, brittle, heat- and corrosion resistant, and shaped by firing a nonmetallic mineral at high temperatures.

### **315.05 Nonmetallic:**

This subclass is indented under subclass 315.03. Material which is not made of an element conductive to heat and electricity (e.g., synthetic resin).

### **315.06 Having a swinging actuator:**

This subclass is indented under subclass 315.01. Ball valve in which the spherical head is rotated about the axis by an actuating means attached thereto, with the actuating means extending from the spherical head generally perpendicular to the axis of rotation.

SEE OR SEARCH THIS CLASS, SUBCLASS:

- 298+, for a pivoted valve that swings around the means by which it is mounted on the valve seat or casing.

### **315.07 Eccentric seating:**

This subclass is indented under subclass 315.01. Ball valve whose spherical head or seat is specifically off center from the axis about which it rotates.

### **315.08 Including trunnion opposite axially extending actuating means:**

This subclass is indented under subclass 315.01. Ball valve wherein the spherical head has a driving stem along the axis about which it rotates and the driving stem is diametrically opposed to the actuating means so as to interfit with a journal means in the housing.

### **315.09 With removable trunnion cover:**

This subclass is indented under subclass 315.08. Device having a detachable plate to protect the trunnion or to permit access (i.e., retainer plate).

### **315.1 Housing construction:**

This subclass is indented under subclass 315.01. Ball valve relating to the assembly of a body structure which completely surrounds the spherical head and defines the flow passage therethrough.

**315.11 Head removable perpendicular to flow passage:**

This subclass is indented under subclass 315.1. Housing which has a component that can be disassembled to allow the withdrawal of the spherical head laterally with respect to the flow passage of the housing.

**315.12 At the actuator side (i.e., top entry):**

This subclass is indented under subclass 315.11. Housing which has a side component that is removable adjacent the actuating means.

**SEE OR SEARCH CLASS:**

137, Fluid Handling, subclass 315.21 for assembling or disassembling a rotary ball valve having a particular valve seat or interface seal therefor and where the ball is removable from an actuator side (i.e., top entry).

**315.13 Assembled around the head:**

This subclass is indented under subclass 315.1. Housing which is assembled by engaging an inlet component and outlet component to create a unitary housing adjacent and surrounding the spherical head.

**315.14 Head removable along one side of flow passage:**

This subclass is indented under subclass 315.1. Housing which has a component that is disassembled parallel to the flow passage and adjacent the spherical head to allow the withdrawal of the spherical head.

**315.15 Having inseparable head:**

This subclass is indented under subclass 315.1. Housing wherein the body structure is unitary so that the spherical head cannot be removed without damaging the valve structure (i.e., housing permanently formed about the head by bending, welding, molding, etc.).

**315.16 Ball construction:**

This subclass is indented under subclass 315.01. Ball valve which relates to the structural design of the spherical valve head.

**316** This subclass is indented under subclass 314. Subject matter comprising seat or sealing elements so constructed or arranged in the casing

as to be readily replaced by strictly manual operations.

**317 Deformable material:**

This subclass is indented under subclass 314. Seat or interface seal made from material that is resilient and thus can be distorted upon sealing engagement (e.g., plastic, rubber, foam, etc.).

**317.01 Carried by head:**

This subclass is indented under subclass 315.18. Seat or interface seal particularly adapted to be attached to the spherical head of the ball valve.

**318** This subclass is indented under the class definition. Subject matter wherein the valve has a linear motion to and from flow obstructing position.

**SEE OR SEARCH THIS CLASS, SUBCLASS:**

62+, for piston type fluid actuated or retarded valve.

129.16, the armature is the valve closure.

215+, and 264+, for screw actuated valves.

**SEE OR SEARCH CLASS:**

137, Fluid Handling, subclass 288 for a hydrant having a reciprocating riser actuated piston type valve, subclass 307 for a hydrant having protection against freezing using stop and waste valves that are fixed relative to each other and reciprocate together, subclasses 315.27-315.32 for a reciprocating valve with assembling or disassembling means, subclass 433 for a liquid level responsive or maintaining system having a rectilinearly traveling float that is rigid, coaxial, and controls a valve, subclasses 442-444 for a liquid level responsive or maintaining system having a float arm operated valve mounted on and reciprocating coaxial to an inlet pipe, subclasses 528-543.23 for reciprocating check and safety valves, or subclasses 625.25-625.69 for reciprocating supply and exhaust multi way valve unit.

222, Dispensing, subclasses 559+ for reciprocating dispenser valves.

- 277, Seal for a Joint or Juncture, for a generic sealing means or process, subclasses 628+ for a static contact seal for other than an internal combustion engine, or a pipe, conduit, or cable.
- 319** This subclass is indented under subclass 318. Valves actuated by a reciprocating means (e.g., push and pull button or rod).
- 320** This subclass is indented under subclass 319. Valves biased or urged to one position.
- 321** This subclass is indented under subclass 320. Valves having a spring biased valve.
- 322** This subclass is indented under subclass 321. Valves wherein a stop (e.g., a collar) for the spring is provided on the valve stem.
- 323** This subclass is indented under subclass 321. Valves wherein the spring abuts a guide for the valve stem.
- 324** This subclass is indented under subclass 318. Subject matter wherein the valve head is a cylinder fitted for slidable reciprocation within or telescopically on a cylindrical seat, which seat provides a guiding and sealing surface for the head substantially throughout the girth thereof so that the head is guided and sealed in all of its positions, there being a port or ports in the cylindrical wall of either the head or seat which will be opened or closed upon reciprocation of the piston.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
157+, especially subclasses 190+ for piston valves with means to increase the head and seat contact pressure to reduce the wear upon operation.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclass 288 for piston type valves of the hydrant type, subclasses 538+ for line condition change responsive piston valves and subclasses 625.37+ for piston valves where the flow is divided and recombined.
- 325** This subclass is indented under subclass 324. Subject matter wherein the piston provides an internal flow passage for the line fluid.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclasses 625.38+ for pistons providing an internal flow passage and including the feature of dividing and recombining the flow.
- 326** This subclass is indented under subclass 318. Devices wherein the valve moves transversely of the flow passage.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
157+, especially subclasses 167+, 175 and 193+ for gate valves having means to increase the contact pressure between the head and seat.  
300, and 301+, for pivoted gates.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclass 15.22 for a process of assembling, disassembling, or repairing a ball valve or rotary ball valve, or subclass 625.45 for a multi way pivoted gate valve or subclass 630.12 for sequentially opening gate valves.
- 327** This subclass is indented under subclass 326. Devices wherein the valve head has two seating faces.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
302, for pivoted bifaced valves.
- 328** This subclass is indented under subclass 326. Devices comprising the substantially stationary valve element with which the head cooperates to produce the valving action.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
359+, for valve seats of general utility.
- 329** This subclass is indented under subclass 326. Devices relating to the body structure.

- 330** This subclass is indented under subclass 318. Devices in which leakage about the valve operating stem is prevented by the engagement of a valve head-like structure carried either by the stem or by the valve head which engages a seat-like structure carried by the valve body when the main valve is opened.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 214, for valves having mechanical movement actuators particularly packed.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclass 315.28 for a reciprocating valve having a particularly packed or sealed mechanical movement actuator with assembling or disassembling means.

- 331** This subclass is indented under subclass 318. Devices wherein the reciprocating member that opens and closes or controls flow of fluid through the valve consists of a flat or cup shaped member of relatively thin deformable material secured at its periphery to the valve body.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 61.2+, for an expansible chamber valve actuator having a flexible wall working member which functions as a valve element to control the flow of fluid through the valve.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclasses 843+ for resilient material, direct response valves.

- 332** This subclass is indented under subclass 318. Devices in which either the reciprocating head element or the cooperating seat is provided with an additional sealing gasket so that when the valve is closed, a nonresilient seal (generally metal to metal) is formed as well as a seal between the gasket and the nonresilient structure with which it engages.

SEE OR SEARCH CLASS:

- 137, Fluid Handling, subclass 516.29 for this structure in direct response valves.

- 333** This subclass is indented under subclass 318. Devices in which both the head and seat surfaces which constitute the valve interface are so constructed that they mutually cooperate to produce the valving action.

- (1) Note. Patents have been placed here in which the peculiar construction of the head requires a particular configuration of the cooperating seat, and vice versa, (i.e., the head would not successfully operate with a conventional seat, e.g., a conical seat, a planar seat, etc.) or in which the mode of operation of the valve depends upon a specifically contoured head or seat to produce some unexpected result.

- 334** This subclass is indented under subclass 333. Devices in which one of the valve elements is metallic and is deformed against its cooperating element within its elastic limit to provide a seal.

#### **335.1 HERMETIC FLEXIBLE WALL SEAL FOR ACTUATOR:**

This subclass is indented under the class definition. Subject matter wherein sealing means comprising a diaphragm or flexible sheet material member is interposed between the actuator and the valve to close the flow passage, the sealing means yielding with the movement of the actuator.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

- 128, for valve devices having a detachable actuator and means for preventing leakage when the actuator is detached.

SEE OR SEARCH CLASS:

- 74, Machine Element or Mechanism, subclasses 18+ for flexible seals pierced by a rod, which seal is fixed to its support and to the rod.  
137, Fluid Handling, subclass 536 for line condition responsive valves having spring means for biasing the valve to

- closed position and means for protecting the spring from the pressure fluid.
- 277, Seal for a Joint or Junction, for a generic sealing means or process, subclasses 634+ for a static contact seal for other than an internal combustion engine, or a pipe, conduit, or cable that is a flexible sleeve, boot, or diaphragm.
- 335.2 Diaphragm:**  
This subclass is indented under subclass 335.1. Subject matter wherein the sealing means comprises the diaphragm.
- 335.3 Bellows:**  
This subclass is indented under subclass 335.1. Subject matter wherein the sealing means comprises and annular pleated expansible and contractible member.
- 336** This subclass is indented under the class definition. Subject matter wherein the valve has one position which it will maintain under the influence of a spring or weight which comprises a biasing means, and force must be applied to the valve in order to have it take a different position.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
66+, for biased trip valves, and see the search notes thereto.  
75, for valves having means to produce a snap action, which usually include biasing means.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclass 315.33 for a check valve (e.g., non-return valve, etc.) with assembling or disassembling means, subclasses 455-543.23 for a line condition responsive valve, especially subclasses 511-543.23 for a direct response valve (i.e., check valve type), subclass 524 for a direct response valve (i.e., check valve type) with bias adjustment indicator, or subclass 530 for a direct response reciprocating valves (i.e., check valve type) having cam means for adjusting and fixing bias.
- 222, Dispensing, subclasses 511+ for resilient biasing means for dispenser outlet elements.
- 337** This subclass is indented under subclass 336. Subject matter including valve springs and means for mounting the spring on the valve.
- SEE OR SEARCH CLASS:  
123, Internal-Combustion Engines, subclasses 90.65+, for poppet valve operating mechanism which includes valve springs and the seats and retainers for the springs.  
267, Spring Devices, subclass 1 for spring devices of general utility.  
411, Expanded, Threaded, Driven, Headed, Tool-Deformed, or Locked-Threaded Fastener, subclasses 427+ for nuts; and subclasses 531+ for washers of general utility.
- 338** This subclass is indented under subclass 336. Subject matter wherein the biasing means is a member of sufficient mass to maintain the valve in the desired position by gravity response.
- SEE OR SEARCH THIS CLASS, SUBCLASS:  
72, for weight biased trip actuated valve.  
76, for impact type actuators for valves.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclasses 38+ for control of change of position or inertia of the system, especially subclasses 45+ for control by pendulum or swinging member, subclasses 403+ for liquid level responsive devices responding to weight of accumulated fluid, and see the search notes to subclasses 403 and 408, subclasses 419 and 421 for weight actuators in quick acting float control valves and subclasses 519+ and 532+ for weight biased valves directly responding to line condition change.
- 339** This subclass is indented under the class definition. Subject matter wherein the valve actuator extends through a fluid inlet or outlet to reach and operate the valve.

- (1) Note. The actuator may emerge from the outlet at the point where the material is freed from confinement, or it may emerge from the main container within the flow line and project through the wall thereof at a point exterior to the main container.
- SEE OR SEARCH CLASS:  
222, Dispensing, subclass 322 and 501 for actuators for discharge assistants and movable outlet elements respectively, which actuators project through the discharge guide.
- 340** This subclass is indented under the class definition. Subject matter wherein the valve actuator comprises an annular member which is mounted around and guided by a pipe which forms a flow passage leading to or from the valve.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
4+, for tube compressors which include means surrounding the pipe to control the flow by deformation of the pipe.
- SEE OR SEARCH CLASS:  
222, Dispensing, subclass 507 for an annular, outlet surrounding actuator for a dispenser outlet element.
- 341** This subclass is indented under the class definition. Subject matter wherein the valve actuator comprises a part of the flow confining means which is exposed to the fluid at a region ahead of the cut-off point, or an extension of such part.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
149+, for valves operated by coupling or conduit motion, and see the search notes thereto.
- SEE OR SEARCH CLASS:  
166, Wells, subclass 334.1 and the subclasses there noted, for well devices comprising valves operated by motion of the conduit supporting the valve, and see subclass 316 for the line between Classes 166 and 251.
- 342** This subclass is indented under subclass 341. Devices in which the wall of the valve casing is jointed or flexible to permit a bending movement which actuates the valve.
- 343** This subclass is indented under subclass 341. Devices in which a movable sleeve constitutes the valve head.
- 344** This subclass is indented under subclass 343. Devices in which a flow passage in the sleeve connects spaced ports in the valve body, and movement of the sleeve controls communication between the ports.
- 345** This subclass is indented under subclass 343. Devices in which the motion of the sleeve is rotary.
- 346** This subclass is indented under subclass 341. Devices in which movement of the valve casing produces plural motions of the valve which may be simultaneous or sequential.
- SEE OR SEARCH CLASS:  
137, Fluid Handling, subclass 315.36 for a particular mechanical actuator providing plural motions of a valve flow control member with repair, tapping, assembly, or disassembly means.
- 347** This subclass is indented under subclass 341. Devices in which movement of the valve casing imparts to the valve a reciprocating motion.
- SEE OR SEARCH THIS CLASS, SUB-CLASS:  
346, for similar valves which have plural motions one of which may be reciprocation.
- 348** This subclass is indented under subclass 341. Devices in which the valve has one position which it will maintain under the influence of a spring or weight which comprises a biasing means, and movement of the casing causes the valve to assume a different position.
- 349** This subclass is indented under the class definition. Subject matter wherein the valve actuator comprises a flow confining member which comprises the inlet or outlet for material passing through the valve.

SEE OR SEARCH THIS CLASS, SUB-CLASS:

153+, for valves combined with particular inlet and outlet means, and see the search notes thereto.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 286+ for hydrants in which the outlet riser is the actuator for the valve, and subclass 616+ for distribution systems wherein the valve actuator is an articulated or swinging flow conduit or nozzle, and see the search notes thereto.

**350** This subclass is indented under subclass 349. Devices in which the inlet or outlet has a removable tip.

**351** This subclass is indented under subclass 349. Devices in which the movement of the inlet or outlet produces plural motions of the valve or valve components which motions may be concurrent or consecutive.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 315.36 for a particular mechanical actuator providing plural motions of a valve flow control member with repair, tapping, assembly, or disassembly means.

**352** This subclass is indented under subclass 349. Devices in which the movement of the inlet or outlet imparts a rotary motion to the valve or valve components.

**353** This subclass is indented under subclass 349. Devices in which the outlet is a nozzle or spout which is capable of actuating the valve by rectilinear motion only.

**354** This subclass is indented under subclass 349. Devices in which there is an impositive connection between the actuator and the valve.

**355** This subclass is indented under the class definition. Subject matter wherein means are provided for lubricating the actuator or valve parts other than those exposed to the fluid flow.

SEE OR SEARCH CLASS:

123, Internal-Combustion Engines, subclasses 90.33+, for poppet valve operating mechanism which provides for lubrication.

137, Fluid Handling, subclasses 237+ for systems in which the lubrication is put into the fluid stream, especially subclasses 246+ for liquid sealing and/or lubrication at the valve interface, subclass 298 for actuator lubricating means in hydrants and subclasses 330+ for nonvalving motions of valves, sometimes intended to prevent sticking, and see the search notes thereto.

184, Lubrication, appropriate subclasses, for installed lubricating means generally.

**356** This subclass is indented under the class definition. Subject matter comprising means for variably restricting or entirely cutting off the flow of fluid through a passage.

(1) Note. The subject matter of this subclass relates to valves, per se, which were included in this class by analogy to the various special types specifically provided for. See the search notes below for a listing of such special types.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 67+ for fusible, soluble and other destructible and deformable closures, subclasses 154+ especially subclasses 173+, 177+ and 197+ for discriminating valves for gas and liquid, subclasses 219+ for Larner-Johnson valves, subclasses 251+ for liquid valves, subclasses 309+ for reversing valves for regenerative furnaces, subclasses 386+, especially subclasses 409+ for float operated valves, subclasses 455+ for line condition change responsive valves, e.g., pop and other safety valves, check valves and safety cut-offs.



**357** This subclass is indented under subclass 356. Subject matter in which the valve is provided with a readily removable or replaceable sealing element.

**358** This subclass is indented under subclass 356. Subject matter comprising valves made of resilient material which are either internally or externally stiffened or otherwise reinforced by a diverse material.

**359** This subclass is indented under subclass 356. Subject matter comprising the normally stationary valving element with which the head or movable element cooperates.

SEE OR SEARCH THIS CLASS, SUBCLASS:

328, for gate valve seats.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 513.3+ for seats of direct response valves with leak passages.

**360** This subclass is indented under subclass 359. Subject matter which are structurally modified to provide for ready removal from the valve body or the partition therein.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 234.5 and 454.2+ for removable valve head and seats units, subclasses 329.51+ for removable seats duplicated and reversible and subclass 533.15 for a removable seat associated with direct response reciprocating ball valve.

**361** This subclass is indented under subclass 360. Devices in which the valve seat is retained between separable sections of a valve body or casing.

**362** This subclass is indented under subclass 360. Subject matter in which the retaining means comprises structure which biases the seat against the partition member by either tensional or compressional engagement with the valve body or casing at a point remote from the partition.

**363** This subclass is indented under subclass 360. Subject matter in which a separate element disposed between the seat and the seat-supporting body structure is provided to prevent leakage between the seat and said supporting structure.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclasses 315.2 through 315.21 for assembling or disassembling a rotary ball valve having a particular removable valve seat or interface seal therefor.

277, Seal for a Joint or Juncture, for a generic sealing means or process, subclasses 628+ for a static contact seal for other than an internal combustion engine, or a pipe, conduit, or cable.

**364** This subclass is indented under subclass 359. Subject matter provided with a sealing member of resilient material which engages the head and constitutes the sole valving surface of the seat.

**365** This subclass is indented under subclass 359. Subject matter in which the seat is retained in position by deformation of the seat.

**366** This subclass is indented under subclass 356. Devices relating to the valve body or casing.

**367** This subclass is indented under subclass 366. Devices consisting of two or more separable parts and the means for securing them together.

**368** This subclass is indented under subclass 356. Devices relating to the materials of which valve parts are made.

SEE OR SEARCH CLASS:

137, Fluid Handling, subclass 375 for coatings or linings of particular materials.

**369** This subclass is indented under the class definition. Devices not herein-before provided.

SEE OR SEARCH CLASS:

131, Tobacco, subclass 206, 215.1+, 223 for valves in smoking devices for tobacco users.

#### CROSS-REFERENCE ART COLLECTIONS

THE DOCUMENTS IN THE FOLLOWING COLLECTIONS CONTAIN ONLY CROSS-REFERENCES WHICH HAVE BEEN PLACED WITHOUT REGARD TO THEIR ORIGINAL CLASSIFICATION OR TO THEIR CLAIMED SUBJECT MATTER AND THEREFORE ARE ONLY REPRESENTATIVE OF THE ART OR SUBJECT MATTER. CONSEQUENTLY, A COMPLETE SEARCH FOR ART OR SUBJECT MATTER PROVIDED FOR HERE WOULD REQUIRE A REVIEW OF THE HIGHER PORTIONS OF THE CLASSIFICATION SCHEDULE.

**900 VALVES WITH O-RINGS**

This subclass is indented under the class definition. Art collection drawn to valves provided with O-rings.

**901 CURTAIN TYPE VALVES**

This subclass is indented under the class definition. Art collection drawn to curtain type valves.

**902 SPRINGS EMPLOYED AS VALVES**

This subclass is indented under the class definition. Art collection drawn to springs used as valves.

**903 NEEDLE VALVES**

This subclass is indented under the class definition. Art collection drawn to needle valves.

**904 SNAP FIT PLUG VALVES**

This subclass is indented under the class definition. Art collection drawn to snap fit plug valves.

**905 MOVABLE COIL ELECTRICAL ACTUATOR (E.G., VOICE COIL):**

Valves with electrical actuators whose coil windings move when energized.

END